



STORMY FUTURE FOR U.S. PROPERTY/CASUALTY INSURERS:

The Growing Costs and Risks of Extreme Weather Events

A Ceres Report
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ABOUT CERES

Ceres mobilizes a powerful coalition of investors, companies and public interest groups to accelerate and expand the adoption of sustainable business practices and solutions to build a healthy global economy. Ceres also directs the Investor Network on Climate Risk (INCR), a network of 100 institutional investors with collective assets totaling more than \$10 trillion.

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FOREWORD

By
Mike Kreidler



Washington Insurance Commissioner

Extreme weather is hitting the United States with a vengeance and it poses an growing threat to the insurance industry and vast segments of society that rely on insurance for peace of mind and financial security. This summer's devastating drought and record-high temperatures are only the latest reminders of the far-reaching impacts that climate change and extreme weather events pose to U.S. property and casualty insurers still reeling from last year's \$32 billion of insured losses from such events.

These troubling trends come as the industry is already struggling to recover from lower than normal investment returns and a sluggish overall economy.

As the Washington Insurance Commissioner, I am concerned because increasing weather-related losses pose threats to the industry's financial stability, which could ultimately lead to a crisis of affordability and availability of essential insurance for consumers and businesses, as well as solvency problems for insurers themselves. Potentially larger extreme weather losses in the future, driven by climate change, make these scenarios especially worrisome.

My job as insurance regulator is to confirm that companies are adequately addressing the impact of climate change on their risk profiles and ensure that the public has access to insurance to cover these severe weather events.

This is why I have worked with my colleagues in California and New York to mandate that major insurers disclose how they are managing the risks posed by climate change. The data from this climate risk survey will provide regulators, insurers, investors and the broader public with a more complete and accurate picture of what climate change means for the industry and society as a whole. Better disclosure will also focus attention on the industry's critical role in responding to this threat, such as measures to minimize consumer and business exposure and addressing the root causes of global warming itself.

This is because while climate change is a huge risk for insurers, the industry is also well-positioned to be part of the solution. Just as insurers historically asserted their leadership to minimize risks from building fires and earthquakes, insurers have a huge opportunity today to develop creative loss-prevention solutions and products that will reduce climate-related losses for consumers, governments and of course themselves.

This Ceres report, *Stormy Future for U.S. Property and Casualty Insurers: The Growing Costs and Risks of Extreme Weather Events*, is timely and important because it connects the dots on the troubling trends facing the industry and the potentially dire consequences for insurers, investors and the public if left unmanaged.

Given the scale and scope of the challenge that climate change presents, I believe that the industry needs to do more, and that regulators like myself need to do more. The report includes specific recommendations for insurers, investors and regulators for managing these risks. For insurers, they include: better disclosure of climate change risks and response strategies; expanded support of climate change research to better anticipate climate effects on extreme weather; and a stronger role in fostering a low-carbon economy by offering new products and services that support cleaner, more efficient technologies and encouraging policymakers to take steps to lower carbon emissions.

I endorse Ceres' key recommendations in this report and encourage other states to utilize the recommendations as a way to work with the insurance industry to tackle the growing costs and risks of extreme weather events.

Executive Summary: Trends, Findings & Recommendations



The insurance industry is a key driver of the U.S. economy. Its products and actions stimulate trillions of dollars in private investment and influence business activity and building development patterns. Insurance is woven into virtually every economic activity for consumers, taxpayers and governments that are reliant on stable and sound private insurance markets. If that availability and stability are lost, governments and consumers suffer financially. In fact, there is a great need and opportunity for insurers to play an expanded role in managing climate risks and bolstering society's resiliency to severe weather.

Today, rising losses related to extreme weather events are significantly impacting the insurance industry and will increasingly challenge the sector's risk models and underwriting capabilities. In coastal and non-coastal areas alike, U.S. insured losses triggered by volatile weather events are steeply rising.¹ Extreme weather events cost U.S. property/casualty insurers more than \$32 billion in losses in 2011.² While 2012 insured property losses to date are lower, the pattern of extreme weather and associated economic costs are continuing.

These rising payouts come as insurers are simultaneously confronting historically low investment returns and a sluggish overall economy. Even before the recent spate of underwriting losses, the insurance industry's overall financial performance, as measured by average return-on-equity (ROE), lagged significantly behind other industries.³ The threat of rising catastrophic losses triggered by increasing concentrations of insured assets, along with a changing global climate, present very real and significant challenges to the sector's financial future.

The implications of these rising loss trends are obvious for insurance companies and their shareholders. Beyond just declining profitability and returns, these increasingly visible trends could undermine some insurer's ability to manage and, in some cases, even survive, future catastrophic, weather-related loss events.

Investors in insurance companies are not the only ones affected by these issues. Extreme weather is already causing more businesses and properties to be uninsurable in the private insurance markets, leaving the higher risks and costs to governments, taxpayers and individuals. In fact, since 1990, total government exposure to losses in hurricane-exposed states has risen more than 15-fold to \$885 billion in 2011.⁴

Insurance sector losses and lackluster financial results have even broader implications. Taken to their logical conclusions, these trends could ultimately undermine our state, regional and national ability to rebound from the shocks of natural disasters. The state of Florida's huge exposure as the "insurer of last resort" for more than one million homeowners—a situation triggered by insurers withdrawing from the state after several devastating hurricanes—is living testament to this.⁵

Against this backdrop, this Ceres report, "Stormy Future for U.S. Property and Casualty Insurers," examines how extreme weather trends may be a harbinger of significant challenges ahead for a sector in which many companies are already confronting profitability and growth challenges. This analysis is based on a careful review of U.S. property/casualty insurance industry financial results as reported by A. M. Best Company in early 2012.

The report's key findings and recommendations are as follows:

1 Munich Re, "2011 Natural Catastrophe Year in Review," January 4, 2012. Retrieved online from <http://www.ctnow.com/media/acrobat/2012-01/67158951.pdf>.

2 ISO Property, "2011: A Year to Remember." Retrieved online from <http://www.isopropertyresources.com/Feature-Story/Articles/2011-A-Year-to-Remember.html>.

3 Dr. Robert Hartwig, "Is the World Becoming a Riskier Place? Overview & Outlook for the P/C Insurance Industry: 2012 & Beyond," PLUS Conference 2011 San Diego, CA November 2, 2011. Retrieved online from www.iii.org/presentations.

4 Dr. Robert P. Hartwig, "Residual Market Property Plans: From Markets of Last Resort to Markets of First Choice—2012," July 2012. Insurance Information Institute.

5 Ibid.

EXTREME WEATHER RISKS TO THE PROPERTY/CASUALTY INSURANCE SECTOR ARE GROWING

More frequent and severe extreme weather events, along with increasing populations in coastal areas and other exposed regions, are having profound impacts on the property/casualty insurance sector. The value of insured losses due to weather perils has been trending upward over the past 30 years, with 2011 exacting an especially heavy toll.⁶ Overall, the estimated \$44 billion of insured catastrophe and extreme weather losses in 2011 was second only to 2005 when Hurricanes Katrina, Rita and Wilma hit the Gulf Coast (with insured losses totaling approximately \$60 billion).⁷

In early 2011, insurers watched as severe weather including tornadoes in Missouri, wildfires in Texas, hailstorms in Arizona and flooding along the Mississippi River drained their capital reserves. For many insurers, these spring storm events substantially eroded or exceeded their 2011 budgets for catastrophe losses, making last year's relatively quiet hurricane season a blessing. It is notable that while the property/casualty industry remains strongly capitalized, shock events can push more vulnerable companies into the red and even insolvency.

By year-end, the industry's net underwriting loss was \$34 billion and the industry had suffered the most credit downgrades in a single year since 2005.⁸ 2011 was also marked by a record 99 disaster declarations by the federal government, significantly exceeding the prior record of 81 set in 2010.⁹

While 2012 insured losses (so far) are significantly lower, total economic losses due to extreme weather have been no less troubling in 2012. Extreme drought conditions across much of the country have already devastated corn, soy, wheat and other crops. While almost all commercial crops in the U.S. have some form of weather insurance, the federal government heavily subsidizes both the initial cost of protection and the resulting claims. As a result, taxpayers are going to pay tens of billions of dollars indirectly—in addition to the direct cost of higher food prices.¹⁰

Given that weather peril losses have been trending upward for years, due to a combination of higher concentrations of property in vulnerable areas and increasingly more severe and frequent extreme weather events, there is strong reason to believe that 2011 and 2012 are not anomalies. Consider these trends:¹¹

- Losses from **excessive precipitation** during 2008-2011 were the highest on record.
- Average annual **winter storm** losses have nearly doubled since the 1980s.
- Since 1980, **wildfires** burned the highest amount of acreage in 2005, 2006 and 2007; and in 2010, wildfires caused over \$1 billion in damage (and in 2012 record setting wildfires occurred in Colorado and other parts of the West.); and
- Losses from **low precipitation (drought)** during 2012 will be the highest since 1988.¹²

CLIMATE CHANGE WILL LIKELY WORSEN FUTURE LOSSES

The worldwide impacts of climate change are already discernible. Global average as well as land and ocean temperatures have increased.¹³ Worldwide, the hottest days are now hotter,¹⁴ and extremely hot summers are now 40 times more frequent.¹⁵ There have also been regional increases in more pronounced heat waves and heavy precipitation events, all of which exceed the levels expected from standard climate variability.¹⁶

Within the United States, average temperatures have risen over the past half-century, while extreme weather events, including heat waves, droughts and floods, have become more frequent and intense. More than 25,000 new record highs have been set in 2012 alone across the US.¹⁷ These changes are already causing deepening economic damages in the form of crop losses, wildfire losses, supply chain disruptions and critical infrastructure outages.

Looking ahead, insurers will need to better understand and anticipate changes in the climate and weather extremes so they can adapt their pricing accordingly and promote effective risk management strategies to customers. However, recent

6 Munich Re, "2011 Natural Catastrophe Year in Review," January 4, 2012. Retrieved online from <http://www.ctnow.com/media/acrobat/2012-01/67158951.pdf>.

7 A.M. Best Company, "U.S. P/C Industry 2011 Results Slammed by Catastrophe Losses," *Best's Special Report*, February 6, 2012.

8 Ibid.

9 FEMA, "Declared Disasters by Year or State," Retrieved online from http://www.fema.gov/news/disaster_totals_annual.fema.

10 Bryan Walsh, "Win-Win: How Farmers Benefit from the Drought," *Time Health*, July 24, 2012. Retrieved online from <http://www.time.com/time/health/article/0,8599,2120278,00.html>.

11 Dr. Robert Hartwig, "Is the World Becoming a Riskier Place? Overview & Outlook for the P/C Insurance Industry: 2012 & Beyond," PLUS Conference 2011 San Diego, CA November 2, 2011. Retrieved online from www.iii.org/presentations.

12 Luzi Ann Javier and Rudy Ruitenber, "Corn Climbs Fourth Week as Drought Worsens Yield Losses," *Bloomberg*, July 13, 2012. Retrieved online from <http://www.bloomberg.com/news/2012-07-13/corn-poised-for-best-weekly-run-since-november-on-u-s-drought.html>.

13 NOAA Satellite and Information Services, May 2012. Retrieved online from <http://www.ncdc.noaa.gov/sotc/global/>.

14 America's Climate Choices: Panel on Advancing the Science of Climate Change; National Research Council, "Advancing the Science of Climate Change," 2010. Retrieved online from http://www.nap.edu/catalog.php?record_id=12782.

15 J. Hansen, M. Sato, and R. Ruedy, "Public perception of climate change and the new climate dice," Accepted for publication July 2012. *Proceedings of the National Academies of Science*.

16 IPCC, "2012: Summary for Policymakers," *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation*. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, UK, and New York, NY, USA.

17 NOAA National Climatic Data Center. Retrieved online from <http://www.ncdc.noaa.gov/extremes/records>.

loss data suggests that many property/casualty insurers may not currently be well equipped to address the uncertainty of increasingly unpredictable and severe extreme weather events.

Connecting the linkages and impacts between rising temperatures and extreme events remains a highly technical exercise fraught with uncertainty. As a result, many insurers now and increasingly in the future will be underwriting business without fully comprehending the probability and severity of the losses they may sustain.

COMPANY AND SHAREHOLDER IMPACTS

Other factors are contributing to the industry's overall vulnerability. Low interest rates and weak capital market performance have squeezed insurer investment returns, a linchpin of industry profitability. In addition slow overall economic growth is tempering new premium production, further diminishing earnings.

As a result of these trends and their impacts on underwriting losses, overall profitability of the property/casualty insurance sector significantly lags behind other industries'. In fact, the return on equity (ROE) for all Fortune 500 companies has substantially exceeded the property/casualty sector ROE in every year since 1994.¹⁸

2011 was an especially tough year. Relatively weak investment returns from the industry's \$1.3 trillion of invested assets combined with the large underwriting losses, resulted in a 61 percent decline in pre-tax operating income compared to 2010.¹⁹ Another troubling sign: A.M. Best has indicated that the sector's reserve cushion is nearing exhaustion. Without this benefit, there is added pressure for insurers to maintain profitability from core underwriting results.²⁰

It is important to note that the industry, as of late summer 2012, has demonstrated its resiliency to increased weather related claims, despite the increasing number of negative rating actions. Still, a growing number of industry stakeholders believe that these conditions have the potential to undermine the industry's ability to thrive in the face of future potentially larger extreme weather calamities. Industry reports confirm this outlook.

"Looking ahead, we believe higher catastrophe losses, a relatively weak macroeconomic environment, lower investment yields and the tapering off of the benefit of reserve releases are likely to weigh on profitability for the overall P/C industry," concluded Standard & Poor's, in its 2012 Industry Outlook.²¹

"The P/C industry will face increasing headwinds that will pressure operating performance and capital levels for many insurers," stated global reinsurance broker Guy Carpenter & Co. in a 2012 report.²²

"Catastrophe activity remains the wild card every year, but expectations are for continued above-average storm activity, including increased frequency of non-hurricane storms," warned A.M. Best, in a February 2012 special report.²³

INSURANCE AFFORDABILITY

Property insurance affordability and availability is already coming under increasing pressure due to increasing extreme weather losses. For example, Risk Management Solutions, the market leader in catastrophe risk modeling, recognizes that its 100-year database of historical Atlantic hurricane activity is no longer a valid predictor of future risk.²⁴ As a result, in May 2011 RMS released a new catastrophe model for Atlantic storms with significant implications for property insurance underwriting and pricing. Among its key projections for the coming five years:²⁵

- ➔ The likelihood of a Cat 3 storm making landfall on the U.S. coast will be about 20 percent higher than previously modeled;
- ➔ Modeled losses will increase by 40 percent on average for the Gulf Coast, Florida and Southeast;
- ➔ Modeled losses will increase by 25 to 30 percent on average for mid-Atlantic and Northeast coastal regions.

18 Dr. Robert Hartwig, "Is the World Becoming a Riskier Place? Overview & Outlook for the P/C insurance Industry: 2012 & Beyond," PLUS Conference 2011 San Diego, CA November 2, 2011. Retrieved online from www.iii.org/presentations.

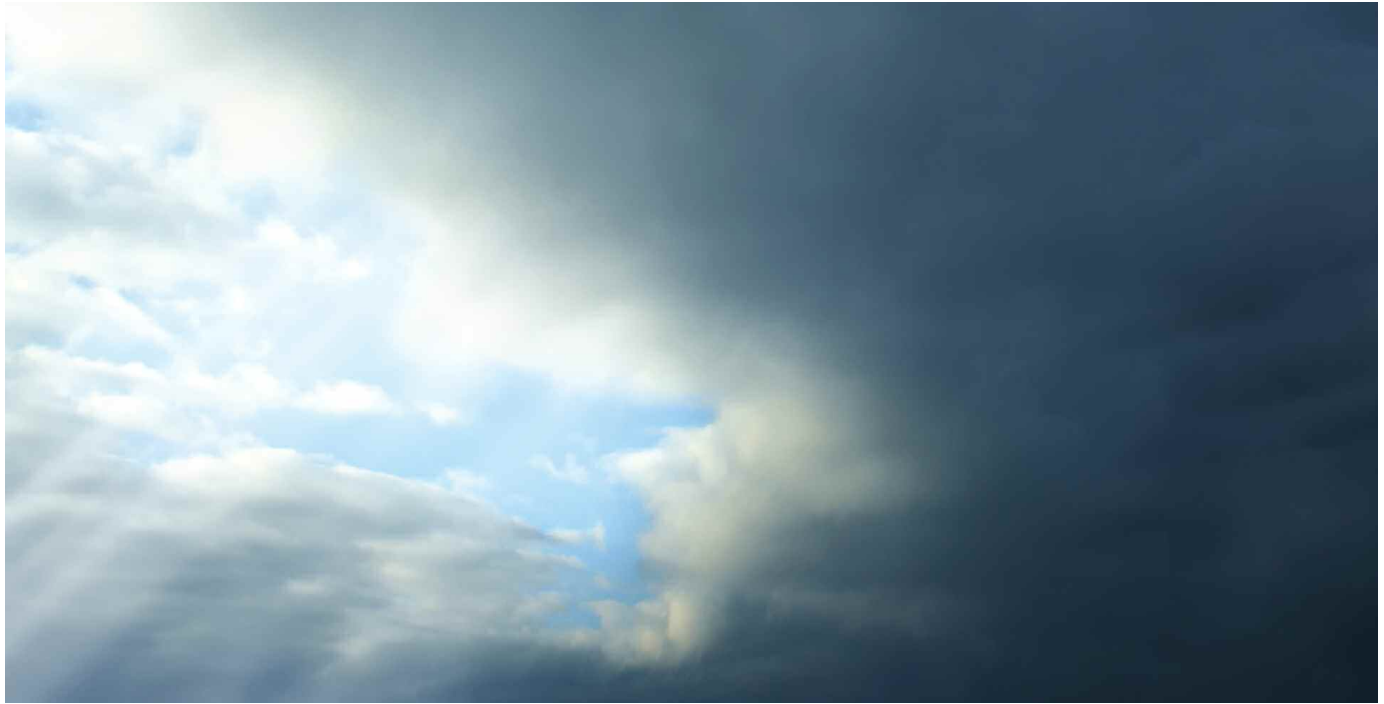
19 A.M. Best Company, "U.S. P/C Industry's 2011 Results Slammed by Catastrophe Losses," *Best's Special Report*, February 6, 2012.

20 Phil Gusman, "A.M. Best: Reserve Releases to Slow as Industry Exhausts Most of Its Cushion," *PropertyCasualty 360*, May 29, 2012. Retrieved online from <http://www.propertycasualty360.com/2012/05/29/am-best-reserve-releases-to-slow-as-industry-exhau>.

21 Standard & Poor's, "U.S. Property/Casualty Insurance 2012 Outlook: Still Stable For Personal Lines And Negative For Commercial Lines," December 1, 2011. Retrieved online from <http://www.standardandpoors.com/ratings/articles/en/us/?articleType=HTML&assetID=1245325866103>.

22 Guy Carpenter, "Catastrophes, Cold Spots and Capital, Navigating for Success in a Transitioning Market," *Renewal Report*, January 2012.

23 A. M. Best Company, "U.S. P/C Industry's Profits Persist; Mounting Challenges Loom Closer," *BusinessWire*, February 2012. Retrieved online from <http://www.businesswire.com/news/home/20110214006386/en/A.M.-Special-Report-U.S.-PC-Industry's-Profits>.



Changes introduced by the new RMS model, combined with last year's record losses, are already creating cost ripples for commercial insurance buyers. The Willis Group and Marsh & McLennan have both seen property insurance rates for catastrophe-exposed risks increase in the range of 10 to 20 percent during first-quarter 2012.²⁶

Consumers are also paying more. Homeowners in wind-exposed areas are seeing rate increases in the range of 5 to 12 percent, and many insurers are restricting capacity, increasing deductibles and requiring wind mitigation construction.²⁷

A CRITICAL ROLE FOR INSURERS

There is evidence from all around the world that society is increasingly vulnerable to the impacts of weather related natural catastrophes. In even the best-case scenarios, this will increase due to climate change. Building resiliency, while reducing future greenhouse gas emissions, are necessary and complementary strategies for dealing with climate change.

Insurers have historically been influential in motivating society to reduce risks, whether by advocating for smoke detectors in buildings or safety restraints in vehicles. Insurers have much to offer, and much at stake, in helping governments and private markets to further understand and develop solutions to better predict and prevent losses from extreme weather events. For instance, stronger resiliency to extreme weather is of great importance to the insurance sector as it reduces property risks, and promotes future insurability.

We have seen excellent examples of insurer sector leadership in addressing climate risks, but industry-wide engagement and action in this regard is nowhere near its potential.

24 NAPCO LLC, "The Impact of Changes to the RMS U.S. Hurricane Catastrophe Model," 2011. Retrieved online from <http://www.napcollc.com/articles/JuneReviewRMSHurricane.pdf>.

25 Ibid.

26 Business Insurance, "Property/casualty insurance rates increasing modestly," April 15, 2012. Retrieved online from <http://www.businessinsurance.com/article/20120415/NEWS04/304159952>.

27 "MarketScout: Personal Lines Rates Up 1 Percent in April," *PropertyCasualty 360*, May 9, 2012. Retrieved online from <http://www.propertycasualty360.com/2012/07/12/politics-policyholder-sentiment-drive-rapid-residu>.

RECOMMENDATIONS

(Re) Insurance Companies

- **Evaluate and price the increased risk exposure of insured property in the context of climate change and new/emerging extreme weather patterns.** Insurance companies—and the companies (and individuals) they insure—need to look at their risk exposure and evaluate losses to insured property based on new and emerging weather patterns, not on past experience.
- **Support/undertake research on national and regional forecasting of future weather and catastrophe patterns.** While there is strong scientific consensus around climate change, there is a particular need to advance our understanding of the likely impacts of warming temperatures on the frequency and severity of thunderstorms, hailstorms and tornadoes, of which little is known.
- **Develop and use catastrophe models that anticipate the probable effects of climate change on extreme weather events.** Insurers with deep scientific resources should partner directly with climate scientists to develop new modeling capabilities. For many carriers, with little scientific expertise, it is equally important that the impact of climate change on extreme inland and coastal weather events be a routine part of the conversation with catastrophe model vendors and reinsurance brokers.
- **Update insurance pricing and underwriting of risks to reflect changes in extreme weather impacts/changes on property damage loss trends.** Insurers need to ensure that rates and loss reserves adequately cover damages from higher frequency and severity of catastrophic events. Insurers will also need to increase their ability to offer preferential pricing to property owners who have increased the resiliency of their structures.
- **Inform land use planning, infrastructure design and building codes to ensure continued insurability in critically exposed markets and markets expected to face future insurability challenges.** The potential for damages from extreme weather events is a major threat to all aspects of society, including our critical infrastructure (including roads, bridges, airports, water treatment facilities and dams). Insurers can lend their expertise directly to planners and work collaboratively with nongovernmental organizations with on-the-ground capacity in critical population centers.
- **Promote reduction of carbon emissions.** By reducing green house gas (GHG) emissions we can still limit the severity of climate change impacts. Insurers must also help enable transition to a low-carbon economy by offering new products and services that promote scaling clean and efficient uses of energy.

Insurance Sector Investors/Rating Agencies

- **Encourage insurance companies to improve disclosure of climate change risks/opportunities and response strategies.** Disclosure expectations should be consistent with disclosure mandates now being required by state insurance regulators in New York, Washington and California.
- **Conduct their own analysis of insurance company exposure and management responses** to extreme weather risks and other climate-related impacts.
- **Build climate change management practices into regular dialogues** with insurance companies and other companies being impacted by climate change.

Insurance Regulators

- **Strengthen mandatory climate risk disclosure** by expanding the number of states participating, and by clarifying disclosure expectations.
- **Build climate risk considerations into the financial oversight process** through the addition of climate change-related questions to the Financial Condition Examiners Handbook.
- **Create more shared resources to help insurers analyze and respond to climate-related risks and opportunities,** including investment risks and opportunities, correlated risks and loss modeling.
- **Engage with insurers, and consumers to better understand the nature of climate change risks,** how they will impact rates, and what steps insurers and regulators needs to take to better incentivize consumers to increase the resiliency of their homes and businesses.

Global Extreme Weather Impacts



Worldwide, devastating earthquakes in combination with a large number of extreme weather events and catastrophes made 2011 the costliest year ever for natural catastrophe losses on a global basis.¹ At about \$380 billion, estimated global economic losses from catastrophes were nearly two-thirds higher than in 2005, the previous record year.²

Globally, these events cost property/casualty insurers well in excess of \$100 billion, reflecting the second highest year ever for insured losses. Although nearly 50 percent of global losses were driven by earthquake activity,³ losses from extreme weather events—including severe storms, tornadoes, flooding, and wildfires—caused the remaining 50 percent and extracted a heavy toll.

In fact, nine of the top ten catastrophic events around the world in terms of the number of property insurance claims for structures damaged or destroyed in 2011 were related to extreme weather events.

Severe weather events are significantly impacting major population centers around the world. Devastating flooding and landslides have caused widespread damage and loss of life in Italy, France, Spain, Guatemala, Pakistan, Thailand, Australia and Brazil. Severe winter storms and cyclones took place across Europe and Australia, while droughts and wildfires affected Somalia and Canada.

Table 1: Top 10 Structural Damage/Filed Claim Events in 2011

Event	Event Location	Fatalities	Number of Structures/Claims	Economic Loss Estimates (USD)
Flooding	Thailand	790	4,000,000	45.00 billion
Flooding	Pakistan	520	1,600,000	2.00 billion
Earthquake*	Japan	15,844	1,100,000	210.00 billion
Hurricane Irene	U.S. Caribbean	46	835,000	8.55 billion
Severe Weather	U.S.	181	750,000	9.10 billion
Severe Weather	U.S.	344	700,000	10.20 billion
Flooding	Thailand	61	609,967	880.00 million
Flooding	China	239	500,000	6.65 billion
Flooding	Colombia	116	375,000	5.85 billion
Typhoon Nock-ten	Philippines, China	94	340,000	126.00 million

*Of the top 10 structural damage/filed claim events in 2011, only the earthquake in Japan is geophysical, and therefore not related to severe precipitation, hurricanes or severe storm events.

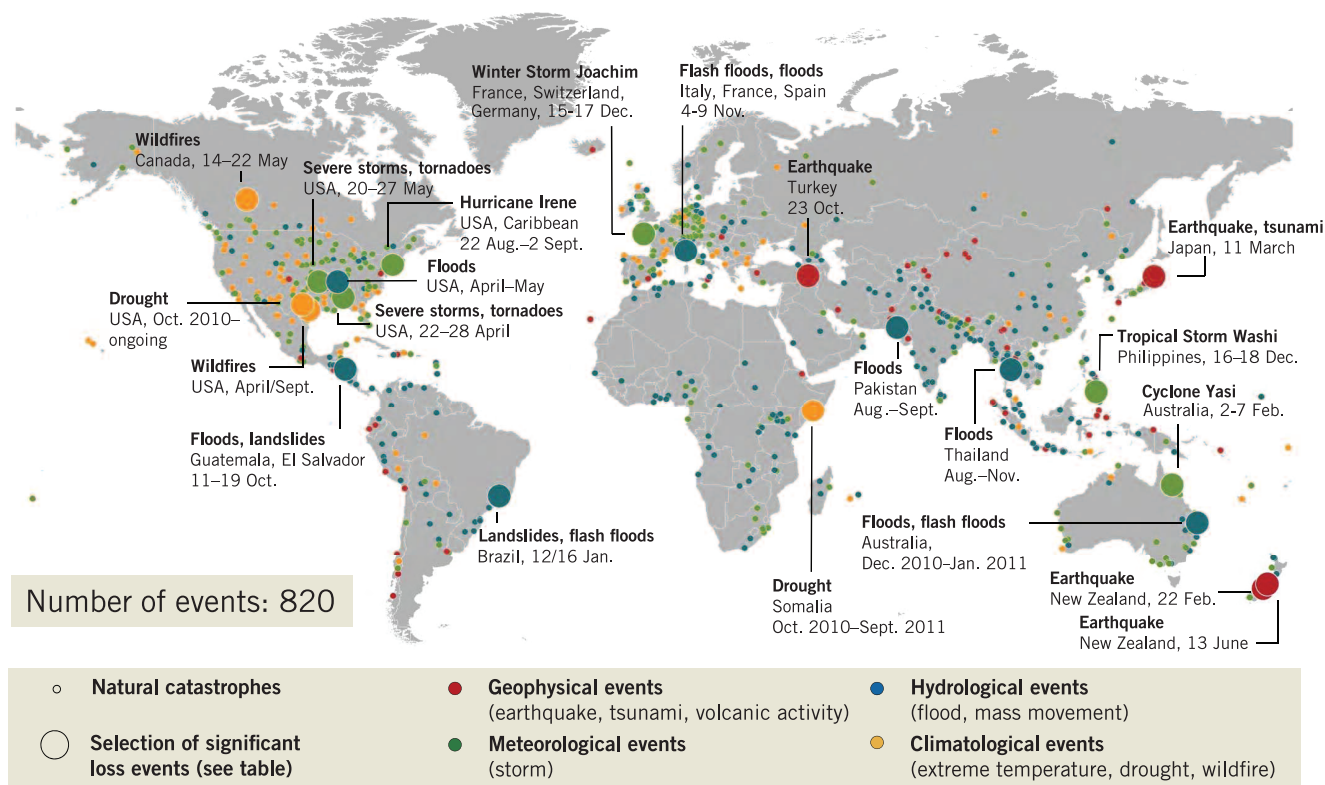
Source: AON Benfield, "Annual Global Climate and Catastrophe Report, Impact Forecasting 2011."

¹ Munich Re Press release, "Review of natural catastrophes in 2011: Earthquakes result in record year," January 4, 2012. Retrieved online from http://www.munichre.com/en/media_relations/press_releases/2012/2012_01_04_press_release.aspx.

² Ibid.

³ While earthquakes are not weather-related events, the devastation caused by the massive Japanese earthquake highlights the challenges urban areas face from extreme events where impacts are magnified due to high concentrations of people and infrastructure. While Japan's political, social and built environments are amongst the best prepared in the world for natural disasters, many critical systems were compromised from the effects of the 2011 earthquake and tsunami.

Figure 1: National Catastrophes Throughout the World in 2011



Notably, the interdependencies of today's global economy have also resulted in insured losses far beyond the sites affected by natural disaster. For example, the extreme flooding in Thailand, with associated loss estimates currently at \$15 billion,⁴ testifies to the potential economic damage caused by supply chain disruptions. As a result, home computer shipments to the U.S during the first quarter of 2012 were expected to drop more than 20 percent from the previous quarter.⁵

"The disasters in Japan and Thailand this year were the worst hit that CBI [Contingent Business Interruption] coverage ever took," said Volker Muench, head of corporate underwriting property at Allianz SE's industrial-insurance unit. "Japan is a very important link in the global supply chain and basically Thailand is its backup for some industries."⁶

4 Insurance Journal, "Bests Analyzes Impact of Flood Losses on Thai Insurance Industry," February 10, 2012. Retrieved online from <http://www.insurancejournal.com/news/international/2012/02/10/235055.htm>.

5 The Associated Press, "Thai Flooding Impact on Tech companies, suppliers," *Boston Globe.com*, February 7, 2012. Retrieved online from http://www.boston.com/business/technology/articles/2012/02/07/thai_flooding_impact_on_tech_companies.

6 Oliver Suess and Carolyn Bandel, "Floods, Tsunami May Dent 'Black Box' Supply-Chain Insurance," *Bloomberg*, December 9, 2011. Retrieved online from <http://mobile.bloomberg.com/news/2011-12-08/floods-tsunami-may-dent-black-box-of-supply-chain-insurance>.

U.S. Extreme Weather Impacts



In the US, the National Oceanic and Atmospheric Administration (NOAA) confirmed that 2011 was also a record-breaking year for climate extremes.⁷ Many regions faced historic levels of heat, precipitation, deadly tornadoes and severe storms. In response, the federal government issued 99 disaster declarations during 2011,⁸ a new record.⁹

During 2011, the U.S. experienced 14 major extreme weather events, each causing \$1 billion or more in damages.¹⁰ Overall economic damages (both insured and uninsured) from all 2011 extreme weather events are estimated to be \$55 billion (see appendix for details).¹¹ The estimated \$44 billion of insured catastrophe and weather-related losses paid in 2011 was second only to 2005, when Hurricanes Katrina, Rita and Wilma hit the Gulf Coast (with insured losses totaling roughly \$60 billion.)¹²

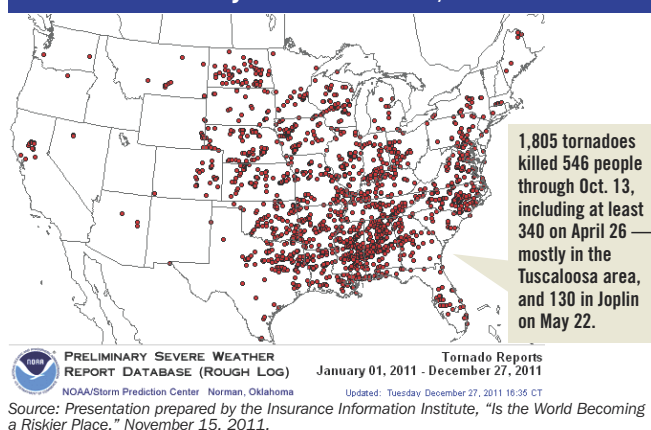
The scale of weather-related losses is especially notable considering that only one hurricane struck U.S. coastlines. In fact, last year's extreme events drove economic and insured losses far away from the geographic areas typically associated with catastrophes. Eight states—Texas, Alabama, Missouri, Tennessee, North Carolina, Kansas, Ohio, and Illinois—suffered insured losses of at least \$1.25 billion and up to nearly \$4 billion.¹³

Thunderstorms, Tornadoes and Windstorms:

2011 was the deadliest thunderstorm and tornado season in more than 50 years, resulting in almost 550 fatalities.¹⁴ The Joplin, Missouri disaster came on the heels of a series of other tornadoes of historic intensity that swept across the south. The Joplin storm caused over \$5 billion of insured losses, which is a level no insurer thought could be caused by a single storm. Estimates for the number of tornadoes in 2011 ranged from approximately 1,700 to 1,800. (See Fig. 2)

The U.S. is continuing to see particularly violent storms in 2012. In late June 2012, a derecho—an usually strong and powerful

**Figure 2: Location of Tornadoes in the US
January 1 - December 27, 2011**



windstorm—hit the eastern U.S. leaving 700 miles of destruction across the mid-Atlantic, killing 20 people and leaving millions without power for days. Fueled by record high heat, the storm generated winds equal to a category one hurricane.¹⁵

As in the case of tornadoes, a possible relationship between derechos and a warming climate is unclear. Historically derechos are rare, and our knowledge of them is incomplete. However, Harold Brooks, a research meteorologist at NOAA, commented that climate change models imply that a warming planet increases storm energy, thus “we expect there will be more environments that are favorable for severe thunderstorms.”¹⁶

7 NOAA, “2011 a Year of Climate Extremes in the United States,” January 19, 2012. Retrieved online from http://www.noaa.gov/stories/2012/20120119_global_stats.html.

8 FEMA, Declared Disasters by Year or State. Retrieved online from http://www.fema.gov/news/disaster_totals_annual.fema.

9 All weather related statistics are from NOAA National Weather Service, October 2011. Retrieved online from http://www.nws.noaa.gov/com/files/2011.09.23_nws_101_presentation.pdf.

10 NOAA, “2011 a year of Climate Extremes in the United States,” January 19, 2012. Retrieved online from http://www.noaa.gov/stories/2012/20120119_global_stats.html.

11 NOAA National Climatic Data Center, “Billion Dollar U.S. Weather/Climate Disasters.” Retrieved online from www.ncdc.noaa.gov/oa/reports/billionz.html.

12 A.M. Best Company, “U.S. P/C Industry 2011 Results Slammed by Catastrophe Losses,” *Best's Special Report*, February 6, 2012.

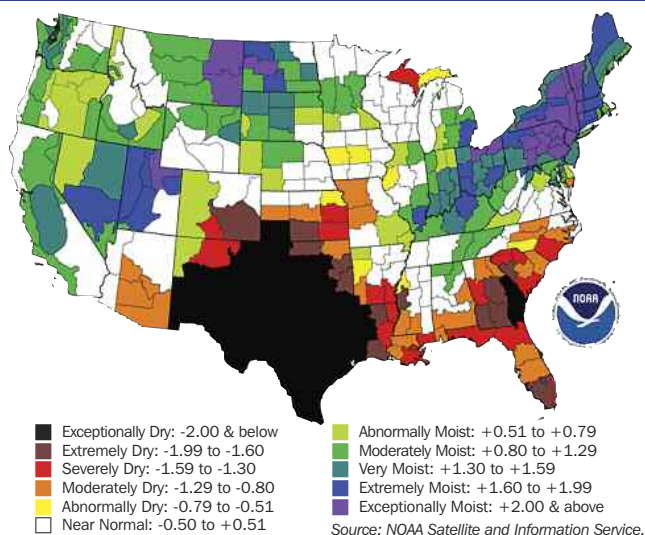
13 Gary Kerney, “2011: A Year to Remember,” ISO Property Claims Service. Retrieved online from <http://www.isopropertyresources.com/Feature-Story/Articles/2011-A-Year-to-Remember.html>.

14 NOAA, “2011 a year of Climate Extremes in the United States,” January 19, 2012. Retrieved online from http://www.noaa.gov/stories/2012/20120119_global_stats.html.

15 Kristina Pydynowski, “Intense Storms Called a ‘Derecho’ Slam 700 Miles of the US,” AccuWeather.com. Retrieved online from <http://www.accuweather.com/en/weather-news/deadly-super-derecho-strikes-m/67383>.

16 Andrew C. Revkin, “Destructive Derecho Tracked by Satellite,” *The New York Times*, July 5, 2012. Retrieved online from <http://dotearth.blogs.nytimes.com/2012/07/05/destructive-derecho-tracked-by-satellite/>.

**Figure 3: Standardized Precipitation index
October 2010 - September 2011**



Heat, Droughts and Wildfires:

Weather patterns during 2011 also created ideal wildfire conditions across most of the southern U.S. including the Southern Plains, which experienced above-average wildfire activity. New Mexico, Texas, Arizona, and Minnesota all had record-breaking wildfires during 2011. In combination, the historic wildfires across the Southern Plains and much of the Southwest resulted in damages exceeding \$1 billion, including the loss of 3 million acres and 1,500 homes in Texas alone.¹⁷

The first half of 2012 has been more of the same, with record-high temperatures and parched timber conditions sparking wildfires that have destroyed 653 homes, more than 244,000 acres, and taken six lives in Colorado alone.¹⁸ According to a recent Weather Channel report, and based on data published by the National Drought Mitigation Center, the ongoing heat across the Midwest has both set temperature records, and intensified drought conditions. According to this source, 56 percent of the continental U.S. is currently experiencing moderate to extreme dry conditions.¹⁹

The insurance sector is being heavily impacted by these conditions. According to a 2012 report by crop risk insurance experts at the University of Illinois, publicly owned crop insurers are expected to pay losses of about \$18 billion due to droughts

that decimated crops.²⁰ Taxpayers will assume a large portion of the losses due to reinsurance agreements between crop insurers and the federal government. Under this arrangement, the higher the losses, the greater the burden assumed. Of the estimated \$18 billion crop loss, taxpayers would pay roughly \$10 billion.²¹

Flooding:

During 2011, flooding in the upper Midwest forced an estimated 11,000 people to evacuate Minot, North Dakota due to the record high water level of the Souris River, where 4,000 homes were flooded.²² Historical flooding along the Mississippi River and its tributaries disrupted an estimated 13 percent of US petroleum refinery output, resulting in higher gas prices.²³ According to NOAA, overall economic losses from the Mississippi flooding ranged from \$3-4 billion across Arkansas, Tennessee, Louisiana, Missouri and Mississippi.



Minot, North Dakota Flooding, 23 June 2011 (FEMA/Andrea Booher)

Hurricanes and Winter Storms:

In August 2011, as Hurricane Irene approached the eastern United States, residents of New York City experienced their first-ever mandatory evacuation of low-lying waterfront areas of the city. These districts and neighborhoods included parts of the financial district in Lower Manhattan, as well as sections along the Hudson and East rivers. Everyone in the “danger” zone, which included 250,000 people, was ordered to leave. In fact, up and down the East Coast more than two million people were told to evacuate.²⁴

Yet the most extreme impacts of Hurricane Irene were not experienced in areas typically associated with hurricane risk. Hurricane Irene resulted in severe flooding damages many

17 NOAA, “2011 a year of Climate Extremes in the United States,” January 19, 2012. Retrieved online from http://www.noaa.gov/stories/2012/20120119_global_stats.html.

18 Deb Stanley, “244,000+ Acres Burned in Colorado in 2012,” *ABC 7 News The Denver Channel*, July 4, 2012. Retrieved online from <http://www.thedenverchannel.com/news/31245142/detail.html>.

19 The Weather Channel, “Drought Sets New 21st-Century Benchmark,” July 6, 2012. Retrieved online from <http://www.s.weather.com/news/drought-monitor-record-extent-20120705>

20 Best’s News Service, “University of Illinois: Crop Insurers Could Face Underwriting Losses of \$18B,” August 27, 2012. Retrieved online from <http://www3.ambest.com/ambv/bestnews/newscontent.aspx?AltSrc=105&RefNum=159603>.

21 Alyssa A. Botelho, “Drought Puts Federal Crop Insurance Under Scrutiny,” August 13, 2012, *The Washington Post*. Retrieved online from http://www.washingtonpost.com/local/drought-puts-federalcrop-insurance-under-scrutiny/2012/08/13/3d9e2960-e0c7-11e1-a19c-fcfa365396c8_story.html.

22 NOAA, “2011 a year of Climate Extremes in the United States,” January 19, 2012. Retrieved online from http://www.noaa.gov/stories/2012/20120119_global_stats.html.

23 Lloyds of London, “Lloyd’s Details ‘Growing Impact of Climate Change’ as UN Meets,” *Insurance Journal*, June 25, 2012. Retrieved online from <http://www.insurancejournal.com/news/international/2012/06/25/252761.htm>.

24 Kevin Dolak, Matt Gutman and Jessica Hopper, “Hurricane Irene: Lights to Go Dark on Broadway, NY Subway; Bodybag Order in NC,” *ABC News*, August 26, 2011. Retrieved online from <http://abcnews.go.com/US/hurricanes/hurricane-irene-york-subways-broadway-shows-shut-bodybags/story?id=14385269#.TOVH5phquFI>.

hundreds of miles inland. The most serious flooding from Irene was reported across Pennsylvania, New Jersey, New York and Vermont. Farms and crops were destroyed, businesses were underwater, houses, bridges and roads were eroded or swept away, and there was widespread devastation in general.

Private insured losses from Hurricane Irene were fairly moderate—some \$4 billion²⁵—considering the density of population and property affected by the storm. In part the relatively low insured damages are the result of the weakened storm that hit New York City (at that point only a Tropical Storm).

Another significant factor explaining these moderate losses is the limited role the private insurance market plays in flood losses in the United States. Numbers on losses stemming from Hurricane Irene to the National Flood Insurance Program are not yet available. Additionally, much of the damage from Hurricane Irene may be pure economic losses, as many affected properties may not have had flood coverage.



HURRICANE IRENE

- Landfalls on August 27 over the NC Outer Banks as a Category 1 hurricane and on August 28 over Brigantine, NJ, and Coney Island, NY, as a tropical storm.
- Minor to moderate wind damage in North Carolina and Virginia, heavy indirect wind damage due to tree fall further north.
- Record flooding across northeast, particularly New Jersey, New York and Vermont.
- Economic losses in U.S. of \$10 billion, insured losses of \$5 billion.

Source: Munich Re, 2011 Natural Catastrophe Year in Review, January 2012.

While 2011 was a year of extreme weather losses, property/casualty insurers have experienced a 30-year trend of increasing costs from natural disasters.²⁶ The following graph, which presents 30-year data on U.S. natural catastrophes from Munich Re's NatCatService, shows that both total economic losses as well as insured losses have risen significantly from 1980 through 2011 (effects of inflation have been controlled).

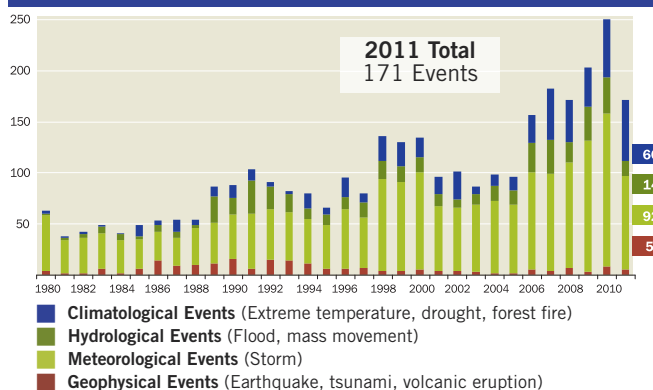
Figure 4: Losses Due to Natural Catastrophes in the United States, 1980 - 2011



Source: Munich Re, "2011 Natural Catastrophe Year in Review," January 4, 2012.

This upward trend in catastrophe events is largely explained by both the growing value of assets damaged, growth of urban areas, and the impacts of increasingly frequent and unpredictable severe weather events. For instance, the following graph shows how during this same 30-year period the number of natural disasters has increased, particularly those related to climatological events (extreme temperatures, droughts and wildfires) and meteorological events (storms).

Figure 5: Natural Disasters in the United States, 1980 - 2011, Number of Events, Annual Totals



Source: Munich Re, "2011 Natural Catastrophe Year in Review," January 4, 2012.

²⁵ Ben Berkowitz, "Insured Loss Estimate from Hurricane Irene Rises to \$4.3 Billion," *Insurance Journal*, November 28, 2011. Retrieved online from <http://www.insurancejournal.com/news/national/2011/11/28/225268.htm>.

²⁶ Munich Re, "2011 Natural Catastrophe Year in Review," January 4, 2012. Retrieved online from <http://www.ctnow.com/media/acrobat/2012-01/67158951.pdf>.

Financial Strain on U.S. Property/Casualty Insurers

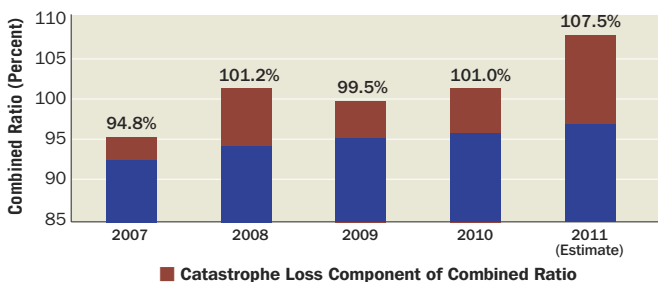


Insurers' financial performance in 2011 demonstrated the industry's vulnerability to increasing weather-related losses. U.S. property/casualty insurers paid an extraordinary \$44 billion for natural catastrophes and extreme weather losses, more than double the amount paid in 2010, and more than \$30 billion of which was related to extreme weather.²⁷

An extended period of hits from catastrophic losses could erode the insurance sector's ability to make necessary future operational and strategic investments.

For many insurers, the accumulation of spring storm events substantially eroded or exceeded their 2011 budgets for catastrophe losses,²⁸ making the relatively quiet hurricane season a blessing for companies that might otherwise have been seriously compromised. Overall, the U.S. property/casualty insurance industry reported a 2011 combined ratio²⁹ of 107.5 percent, of which 10.1 percent was due to catastrophe losses.³⁰

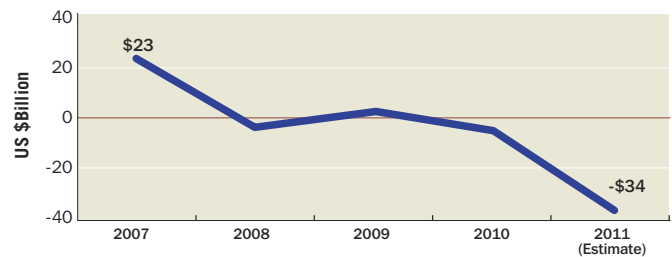
Figure 6: U.S. P&C Insurance Combined Ratio (%) 2007 – 2011 (Estimate)



Source: A.M. Best Company, Best's Special Report. "U.S. P/C Industry's 2011 Results Slammed by Catastrophe Losses," February 6, 2012.

As a direct result of the costs of extreme weather, property/casualty industry net underwriting income (defined as net premiums earned less incurred losses, expenses, and dividends to policyholders) was negative \$34 billion (equal to approximately 6 percent of year-end policyholders' surplus).

Figure 7: Net Underwriting Income (US \$Billion) 2007 - 2011 (Estimate)



Source: A.M. Best Company, Best's Special Report. "U.S. P/C Industry's 2011 Results Slammed by Catastrophe Losses," February 6, 2012.

Investment returns generated by the enormous pools of assets held by insurers are a critical component of insurer profitability,³¹ and strong investment returns can enable insurers to compensate for extraordinary underwriting losses. However, during 2011 persistently low interest rates and capital market volatility put an additional squeeze on insurers' operating income.

A confluence of more frequent weather-related losses, and decreased investment income significantly depressed 2011 property/casualty insurers' earnings.

The extended period of near-zero interest rates, designed to aid an ailing economy, posed significant challenges for insurers and their profitability. The Federal Reserve, which cut its target for the federal funds rate (benchmark interest rates) to a zero-to-0.25 percent range on Dec. 16, 2008,

²⁷ Unless otherwise noted, U.S. property and casualty insurance company 2011 financial results reflect data and analyses published by A. M. Best Company, "U.S. P/C Industry's 2011 Results Slammed by Catastrophe Losses," February 6, 2012.

²⁸ Gary Kerney, "2011: A Year to Remember," ISO Property Claims Service. Retrieved online from <http://www.isopropertyresources.com/Feature-Story/Articles/2011-A-Year-to-Remember.html>.

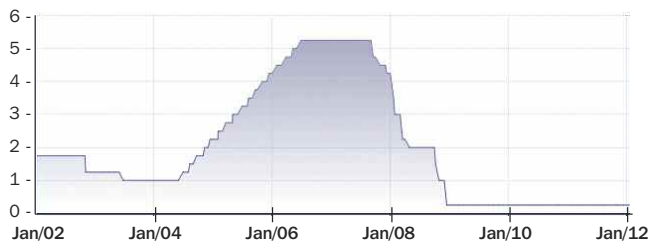
²⁹ The combined ratio is a measure of profitability used by a property and casualty insurance company to indicate how well it is performing in its daily operations. An insurer with a combined ratio below 100% indicates that the company is turning an underwriting profit while one with a ratio above 100% means that the insurer is paying out more money in claims than it is receiving from premiums.

³⁰ Unless otherwise noted, U.S. property and casualty insurance company 2011 financial results reflect data and analyses published by A.M. Best Company, "U.S. P/C Industry's 2011 Results Slammed by Catastrophe Losses," Best's Special Report, February 6, 2012.

³¹ Investment gains reflect the sum of net investment income and realized capital gains (or losses) on investments.

announced in January 2012 that rates would remain “exceptionally low” at least through late 2014.³² According to a Swiss Re analysis, a percentage point decline in interest rates lowers property/casualty insurers’ return on equity by about 2 percentage points.³³

Figure 8: United States Benchmark Interest Rate

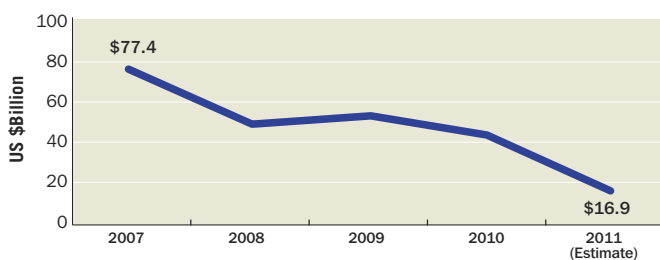


Source: www.tradingeconomics.com.

Simultaneously, during 2011 the Dow Jones industrial average experienced significant instability. Economic uncertainty, especially the sovereign debt crisis in Europe, contributed to ongoing and massive market volatility. Yet property/casualty insurance companies require safe, predictable investment returns to pay claims.³⁴ In the wake of heavy catastrophe losses of 2011 and with an eye to maintaining sufficient cash on hand, insurers began moving some of their money into shorter-term bonds.³⁵ Since shorter-term bonds have lower yields, that shift led to a further squeeze on companies’ investment income.³⁶

In conclusion, relatively weak 2011 investment returns from the industry’s \$1.3 trillion of invested assets were unable to compensate for the magnitude of the underwriting losses. Consequently, pre-tax operating income declined a dramatic

Figure 9: Pretax Operating Income (US \$Billion) 2007 - 2011 (Estimate)



Source: A.M. Best Company, *Best’s Special Report*. “U.S. P/C Industry’s 2011 Results Slammed by Catastrophe Losses,” February 6, 2012.

61 percent from the prior year. It is important to note that despite extraordinarily high losses, the property/casualty sector ended the year well capitalized, demonstrating its overall resiliency to shock losses.

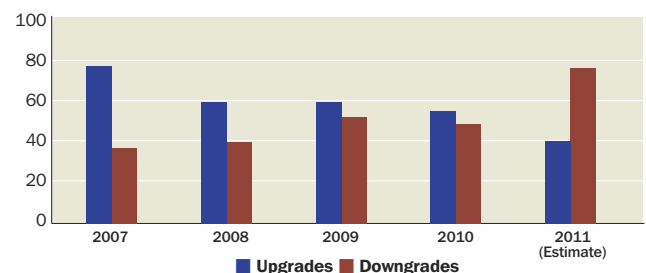
Looking ahead, there may be more severe income effects to come. The reason is that the full extent of recent catastrophe losses on insurers’ solvency may not emerge for several years. Even in the face of extreme losses, insurers can maintain solvency and profitability ratios for several quarters, propped up by reserve releases, only to become financially impaired by unforeseen shock losses.

In the face of weak operating income, insurers’ reliance on reserve releases to shore up current financials may undermine the industry’s ability to weather future losses.

A.M. Best (the leading U.S. organization for insurance industry research, analysis and credit rating) assigns all insurers a financial strength rating (FSR)—an independent opinion of an insurer’s financial strength and ability to meet its ongoing insurance policy and contract obligations. A. M. Best assigns an insurer’s rating based upon a comprehensive quantitative and qualitative evaluation of a company’s balance sheet strength, operating performance and business profile.³⁷

Given the significant decline in industry operating cash flow during 2011, it is not surprising that during this period, A. M. Best’s ratings downgrades for both personal and commercial property/casualty insurers outnumbered upgrades for the first time since 2005.³⁸ Despite a negative trend, the vast majority (80 percent) of insurers had their ratings affirmed.

Figure 10: A.M. Best Financial Strength Ratings Upgrades vs. Downgrades — 2007 - 2011 (Estimate)



Source: A.M. Best Company, *Best’s Special Report*. “U.S. P/C Industry’s 2011 Results Slammed by Catastrophe Losses,” February 6, 2012.

³² Retrieved online from <http://primerate.wsjprimerate.us/>.

³³ Swiss Re Economic Research and Consulting, “Global Insurance Review 2010 and Outlook 2011/12,” December 2010. Retrieved online from http://www.bvzl.de/Newsletter/2011_03/Spotlight_03_EN.pdf.

³⁴ On average, about 64 percent of the property and casualty insurance industry’s portfolio is in high-grade corporate bonds. The average yield on investment-grade corporate bonds has declined to a low of 4.3 percent, from 6.2 percent in July 2007, according to data compiled by Bloomberg.

³⁵ Matthew Philips and Dakin Campbell, “The Hidden Burden of Ultra-Low Interest Rates,” *Bloomberg BusinessWeek Magazine*, February 2, 2012. Retrieved online from <http://mobile.businessweek.com/magazine>.

³⁶ Ibid.

³⁷ A. M. Best Company, “Ratings & Criteria Center,” effective February 17, 2012. Retrieved online from <http://www.ambest.com/ratings/guide.asp>.

³⁸ A.M. Best Company, “U.S. P/C Industry 2011 Results Slammed by Catastrophe Losses,” *Best’s Special Report*, February 6, 2012.

In recent years, reserve releases have helped support current-year results despite significant catastrophe losses. While the property/casualty industry still has cash reserves left to tap, the sector may start to see deteriorating reserves in late 2012 and beyond. For some carriers that are not well diversified from a geographic standpoint, or have inaccurately priced and underwritten insurance contracts, reserve deterioration and financial impairment may come sooner.³⁹

A. M. Best designates an insurer as financially impaired upon the first official regulatory action taken by a state insurance department when an insurer's:⁴⁰

- Ability to conduct normal insurance operations is adversely affected;
- Capital and surplus have been deemed inadequate to meet legal requirements; and/or
- General financial condition has triggered regulatory concern.

While an impaired company may not necessarily be declared insolvent, the causes of impairments are often precursors to insolvencies.

Based on extensive research and a review of 30 years of industry data by A.M. Best, deficient loss reserves/inadequate pricing are the leading causes of insurer financial impairments.⁴¹

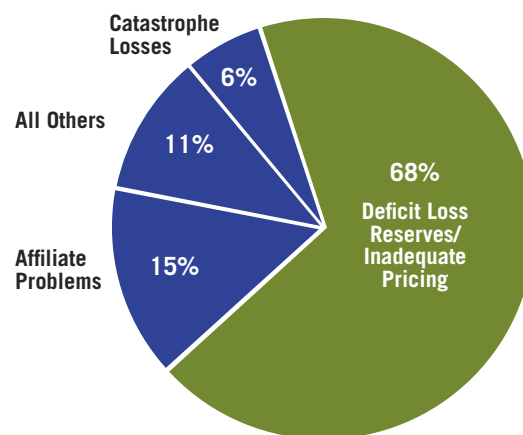
In essence, financial failure is most often linked with an inability to price business according to its risk profile.

During 2011, the total number of property/casualty insurer impairments increased to twenty-eight from twenty-one in 2010 (a 33 percent increase). While this is still a small number, it is of concern and points to the industry's need to confront current challenges. As A.M. Best concluded, "the initial premium was inadequate to cover future losses, and additional loss reserves were needed to be booked."⁴²

Furthermore, in its 2012 Industry Outlook report, A.M. Best stated that the industry's reserve cushion was approaching exhaustion "primarily as a result of significant reserve releases and the extent to which rate levels have been inadequate as a result of predominating soft-market conditions in recent years."⁴³

A recent Keefe, Bruyette & Woods report said 2012 first-quarter reserve releases were "surprisingly strong," and beat the firm's estimates, but the firm agrees with A.M. Best that the first quarter's strength in this area is unlikely to be repeated and KBW also expects a slowing of reserve releases as the year progresses.⁴⁴

Figure 11: Primary Causes of U.S. Property/Casualty Insurer Impairments — 2010 - 2011



Source: Best Week, "Stable Prices, Rate Firming, Offer Hope," February 6, 2012.

"Insurers have been 'sticking their hands in the financial cookie jar' for the past few years by releasing reserves to help boost financials. The time may have come where the jar is empty with significant implications for sector profits and capital growth."

Guy Carpenter & Co., *Catastrophes, Cold Spots and Capital, Navigating for Success in a Transitioning Market. January 2012 Renewal Report.*

While the property/casualty insurance sector has historically experienced profitability peaks and troughs, primarily related to the underwriting pricing cycle, a prolonged future period of low interest rates, capital markets volatility and intensified weather losses may fundamentally alter the sector's ability to successfully balance its underwriting and investment risks.

In fact, a number of industry experts, including A.M. Best and Standard & Poor's, have commented that these trends are not expected to abate in the near-term, but will continue to drive performance results. Standard & Poor's believes the profitability of insurers will likely increasingly result from their underwriting and risk-mitigation practices and less on investment income and favorable reserve development.

39 Guy Carpenter, "Catastrophes, Cold Spots and Capital, Navigating for Success in a Transitioning Market," *January 2012 Renewal Report*. Retrieved online from <http://www.guycarp.com/portal/extranet/insights/reportsPDF/2012/jan1renewals.pdf?sessionid=QTBDpQtmYMLzv5y0ngLHwQ6rYzn5RvFMRvgHqvtJN6ZNnd09MN!1770117303?vid=3>.

40 A. M. Best Company, "Best's Impairment Rate and Rating Transition Study—1977 to 2011," *Best's Special Report*, March 26, 2012. Retrieved online from <http://www.ambest.com/nrsro/impairment.pdf>.

41 A.M. Best Company, "1969-2010 Impairment Review," *Best's Special Report*, April 2011.

42 A.M. Best Company, "Stable Prices, Rate Firming, Offer Hope," *BestWeek U.S./Canada*, February 6, 2012.

43 Phil Gusman, "A.M. Best: Reserve Releases to Slow as Industry Exhausts Most of Its Cushion," *PropertyCasualty 360*, May 29, 2012. Retrieved online from <http://www.propertycasualty360.com/2012/05/29/am-best-reserve-releases-to-slow-as-industry-exhau>.

44 Ibid.

“Looking ahead, we believe higher catastrophe losses, a relatively weak macroeconomic environment, lower investment yields, and the tapering off of the benefit of reserve releases are likely to weigh on profitability for the overall P/C industry.”⁴⁵

S&P, U.S. Insurance Outlook, 2012.

Similarly, A.M. Best has stated its expectation that non-wind losses will continue to shape financial performance in the sector.

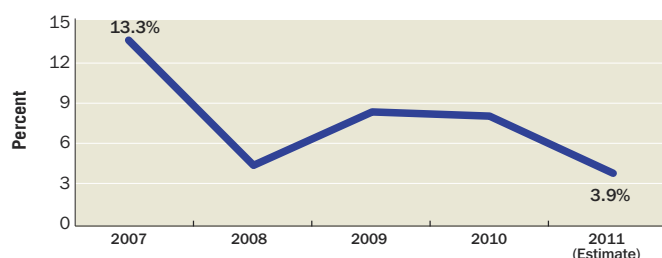
“Catastrophe activity remains the wild card every year, but expectations are for continued above-average storm activity, including increased frequency of non-hurricane storms.”

A. M. Best, U.S. P/C Industry's Profits Persist; Mounting Challenges Loom Closer, February 14, 2012.

For insurance shareholders, 2011 was the capstone on more than a decade of persistent underperformance.

So far, this paper has outlined how a confluence of extreme weather-related losses, low interest rates, capital markets volatility and slow economic growth squeezed property/casualty insurers' 2011 earnings. While the industry has historically been able to weather each of these challenges, in combination they have significantly undermined the profitability of insurers' business models. On-going under-pricing of risks, especially in light of significant changes in weather patterns, and a general depletion of the sector's reserve cushion, may spur a future increase in insurer impairments and possibly insolvencies. These observations indicate that property/casualty insurers will face mounting challenges that could have serious financial consequences for policyholders and shareholders alike.

Figure 12: U.S. P&C Insurance Industry: Percent After-tax Return on Surplus (ROE) — 2007 - 2011 (Estimate)

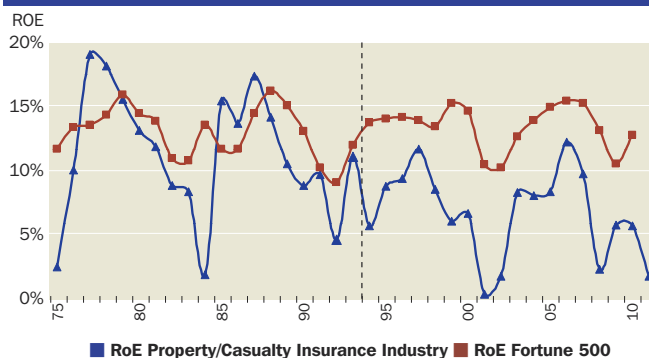


Source: A.M. Best Company, Best's Special Report. "U.S. P/C Industry's 2011 Results Slammed by Catastrophe Losses," February 6, 2012.

The poor property/casualty insurance sector 2011 returns reflect a further deterioration of a 15-year trend. According to an analysis published by the Insurance Information Institute, profitability of this sector significantly lags behind other industries. The combined return on equity (ROE) for Fortune 500 companies during the period 1994—2011 substantially exceeded the property/casualty industry in every year.⁴⁶ These results reflect a reversal from the 1975—1993 period when the property/casualty insurance industry ROE substantially surpassed or was equal to the Fortune 500 in a significant number of years.

Superior financial performance continues to be achieved by some property/casualty insurers despite strong headwinds. Each year, the Ward Group assesses the financial performance of over 3,000 property/casualty U.S. insurers and identifies the top 50 performers. The Ward's 50 property/casualty insurance companies delivered an 11.2 percent statutory ROE from 2007 through 2011 compared to 5.9 percent for the industry overall.⁴⁷

Figure 13: Property/Casualty Insurance Industry Return On Equity vs. Fortune 500, 1975-2011*



*2011 reflects return on admitted surplus for the first half of the year.
Source: Insurance Information Institute, "Is the World Becoming a Riskier Place? Overview & Outlook for the P/C Insurance Industry: 2012 & Beyond," Insurance Information Institute, Retrieved online at www.iii.org/presentations.

45 Standard & Poor's, "U.S. Property/Casualty Insurance 2012 Outlook: Still Stable For Personal Lines And Negative For Commercial Lines," December 1, 2011. Retrieved online from <http://www.standardandpoors.com/ratings/articles/en/us/?articleType=HTML&assetID=1245325866103>.

46 Dr. Robert Hartwig, "Is the World Becoming a Riskier Place? Overview & Outlook for the P/C Insurance Industry: 2012 & Beyond," PLUS Conference 2011 San Diego, CA November 2, 2011. Retrieved online from www.iii.org/presentations.

47 2012 Wards 50 Top Performing P&C Insurers. Retrieved online from <http://www.wardinc.com/wards50/WardGroup-W50-12-PC-Article.pdf>

Preparing to Manage Climate Risks

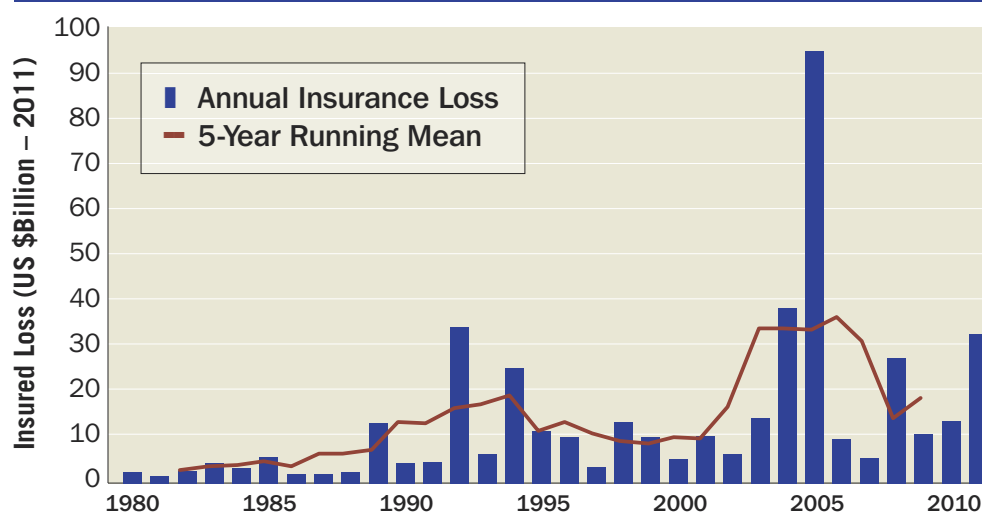


There is strong reason to expect that last year's cluster of negative events on the insurance industry was not a fluke. Globalization, increased economic dependency on far-reaching supply chains, and growing concentrations of people in exposed areas are already shaping loss trends in the global insurance industry.

These trends have already magnified loss potential, and will be further exacerbated by climate change, which will increase the frequency, intensity, duration, and timing of extreme weather events.⁴⁸ The industry's vulnerability to present-day weather extremes underscores the need for stronger vigilance regarding management of insurers' climate risks.

Insurers and other industry players are beginning to recognize that climate change is already contributing to more frequent losses,⁴⁹ and is doing so in ways that defy historical trends, undermining the industry's ability to manage the risks of future events.⁵⁰

**Figure 14: U.S. Insured Losses Due to Weather Perils*
1980 – 2011**



* Tropical cyclone, thunder storm and winter storm only

Source: Munich Reinsurance America, "Climate Change & the Future of Natural Catastrophe Risk," March 9, 2012.

48 IPCC, "2012: Summary for Policymakers," *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation*. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, UK, and New York, NY, USA.

49 Munich Re, "Number of Weather Extremes a Strong Indicator of Climate Change," November 8, 2012. Retrieved online from http://www.munichre.com/en/group/focus/climate_change/strategy_and_policy/strong_indicator_of_climate_change/default.aspx.

50 The Geneva Association, "The insurance industry and climate change—Contribution to the global debate," July 2009. Retrieved online from [http://genevaassociation.org/PDF/Geneva_Reports/Geneva_report\[2\].pdf](http://genevaassociation.org/PDF/Geneva_Reports/Geneva_report[2].pdf); Allianz Group and WWF, "Climate Change and Insurance: An Agenda for Action in the United States," October 2006. Retrieved online from http://assets.panda.org/downloads/allianz_wwf_climate_change_and_insurance_embargoed_oct_2006.pdf; Lloyds. 2006. "Adapt or Bust." Retrieved online from <http://www.lloyds.com/~media/Lloyds/Reports/360%20Climate%20reports/FINAL360Climatechangereport.pdf>.

“With 40 percent of industrial insurance claims that Allianz now pays out being due to natural catastrophes, climate change represents a threat to our business...Insurance companies need to adapt their products and services to take climate change risks into account. Already, insurance payments relating to climatic events are increasing rapidly, with a 15-fold increase in weather-related claims over the past 30 years.”

Allianz, Retrieved online from www.allianz.com/en/about_allianz/sustainability/climate_change/index.html?mode=print.

“There is strong evidence that the observed rise in average temperatures has been caused by increasing concentrations of greenhouse gases in the atmosphere. Put simply, a steady rise in global average temperatures changes the energy balance of the climate and leads to higher atmospheric humidity. As they disrupt a complex, well balanced system, the changes are creating tangible risks.”

Swiss Re, 2011 Corporate Sustainability Report, published June 2012.

“The number of natural catastrophes has risen fairly dramatically. Reinsurers are concerned that these experiences are in fact a window on the future—more extreme precipitation events, more droughts, more heat waves, more intense tropical storms and more wildfires. We need a national policy related to climate and weather.”⁵¹

Frank Nutter, president of the Reinsurance Association of America, said at an event in March 2012 with Senators Bernie Sanders (I-Vt.) and Sheldon Whitehouse (D-R.I.).

Many industry observers have described climate change as having the potential to undermine insurers’ prevailing business models and risk management practices. Actuarially-based insurance pricing and industry diversification models are among the fundamental tenets of insurance underwriting that may be challenged by climate change, along with the concept of insurability itself in some parts of the world.^{52, 53}

Similarly, A.M. Best’s assessment of insurer responses to the catastrophic tornado losses of 2011 describe these losses as part of a “climate-change challenged” market:

“Until 2011, tornadoes typically were not considered one of the larger risks for the insurance industry in total. But according to Munich Re, tornadoes were the costliest type of U.S. natural disaster in 2011. It had been rare for a series of tornadoes to inflict more than \$1 billion in losses, but according to Swiss Re, insured losses for tornado and hail damage in the United States reached \$14 billion in 2011.”

The impact of 2011’s increased tornado activity prompted many insurers to accelerate their pace of rate increases, reduced limits and policy exclusions. Some insurers reconsidered what risks they were willing to write and withdrew from certain climate-change challenged markets altogether.”

Catastrophe Frequency Tests Insurers, Best’s Briefing, March 12, 2012.

According to the Intergovernmental Panel on Climate Change (IPCC), a global scientific body tasked with aggregating and interpreting scientific studies on climate change for use by policymakers, some signs of climate change are clearly discernible above the noise of climate variability. For example, in the IPCC’s 2012 *Special Report on Extreme Events*, an analysis of observations since 1950, demonstrates a statistically significant increase in the number of heavy precipitation events, with the result that more regions are experiencing more frequent and intense heavy rains.⁵⁴ The IPCC report also cites likely linkages between climate change and the frequency and severity of heat waves in many parts of the world—a finding that is particularly relevant in light of the recent unprecedented 2012 heat waves that affected much of the U.S. east of the Rocky Mountains.

Due to data inconsistency and the modest amount of research performed on the climatology of tornadoes and hailstorms, the likely effects of climate change on these events are not well understood at present. The strength and direction of observed trends in North America will be more fully assessed in the forthcoming *National Climate Assessment*, due for release by the U.S. Global Change Research Program in 2013.

51 Evan Lehmann, “Reinsurers press Congress to reduce U.S. risk from climate change,” *ClimateWire*, March 2, 2012. Retrieved online from <http://www.climateneeds.umd.edu/climatewire-03-02-12/article-14.php>.

52 Trevor Maynard, “Climate Change: Impacts on Insurers and How They Can Help with Adaptation and Mitigation,” 2008, *The International Association for the Study of Insurance Economics* 1018-5895.

53 Harun Bulut, Frank Schnapp and Keith Collins, “Systematic Risk and Crop Insurance in Retrospect and Prospect,” *Crop Insurance Today*, November 2011. Retrieved online from <http://www.agrisk.org/NCIS PUBS/Today/2011/Today11-11.pdf>.

54 IPCC, “2012: Summary for Policymakers,” *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation*. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, UK, and New York, NY, USA.

As scientific understanding advances, we will have more clarity regarding the relationships between global warming and extreme weather events. In the meantime, insurers and reinsurers alike must make capital allocation and business decisions in light of changing extreme event trends. The problem is that while scientific assessments are punctuated by years, insurers must constantly assess pricing and exposure controls. And for insurers, inaccurate projections of changing risk may spell the difference between a profitable year and insolvency.

“An effective risk management framework accommodates uncertainty, takes advantage of learning opportunities to update understanding of risk, and probes today’s rare extreme events for useful information about how we should respond to rising risk.”⁵⁵

Daniel G. Huber and Jay Gullede, 2011. “Extreme Weather and Climate Change: Understanding the Link and Managing the Risk.”

Few industry observers doubt that global warming and associated extreme weather events will eventually become a driver of performance. As cited earlier in this paper, extreme weather events related to climate change also have the potential to increase future property/casualty insurer impairments and possibly insolvencies. If loss models or actuarial data used to set pricing do not adequately prepare insurers for changing loss trends, and if competitive or regulated markets fail to adjust pricing to reflect changing risks, insurers may find that their rates and loss reserves do not adequately cover damages from higher frequency and severity of catastrophic events.

Climate change has implications for insurers beyond underwriting risk. If climate change were to be so severe as to impact the investment environment which drives insurers’ investment yields, this would further compound the operating risk posed by climate change. Therefore, a company’s ability to honor its obligations to policyholders and deliver returns to shareholders increasingly will depend on that company’s ability to manage climate risks.⁵⁶

Many industry experts are concerned that insurers do not adequately understand the nature and extent of the risks their businesses face due to climate change, nor do insurers see the potential returns that could be achieved through a more strategic response. As with many other risks confronting society, whether natural or manmade, climate change challenges insurers, but it also presents tremendous business opportunities if it is understood, in a comprehensive manner, not only as a constraint but also as a major component of their business model. An effective way to move forward in this regard is to integrate climate change into an insurer’s overall risk management framework.

According to A.M. Best, key tools and processes for property/casualty insurers to strengthen their risk management capabilities include economic capital models, more sophisticated catastrophe modeling and management, along with dynamic financial analysis.⁵⁷ As the sector’s leading rating agency, A.M. Best is fully committed to integrating enterprise wide risk management as a core element of its approach to rating all insurers—large and small. So far, its conclusion is that while the industry is making progress in its efforts to improve its overall risk management capabilities, many carriers today have a long way to go.⁵⁸

⁵⁵ Daniel G. Huber and Jay Gullede, “Extreme Weather and Climate Change: Understanding the Link and Managing the Risk,” December 2011, Science and Impacts Program. Center for Climate and Energy Solutions: Arlington, VA. Retrieved online from <http://www.c2es.org/publications/extreme-weather-and-climate-change>.

⁵⁶ Poor insurance sector financial performance also makes it more difficult for existing insurance companies to raise additional equity, or for new companies to form. Consistently high losses result in a slow erosion of the sector’s capital base, with diminished opportunities for replenishment. An analogy would be that if (re) insurance is intended to be a protective seawall surrounding businesses and homeowners, its very structure is being eroded at a time when the storm surge is also rising.

⁵⁷ A.M. Best Special Report, “Survey Reveals Leaders, Laggards In P/C Enterprise Risk Management,” September 26, 2011. Retrieved online from <http://www3.ambest.com/press/GeneratePressRelease.asp?Frame=true&RefString=65494655775346496652&Refnum=65494655775346496652&Site=press&Tab=1&AltNum=0&AltSrc=2>.

⁵⁸ Ibid.

Future Insurance Affordability and Availability



Insurance affordability and availability will likely be under pressure due to climate change and changes in extreme weather frequency and severity. For example, Risk Management Solutions, Inc. (RMS), the market leader in catastrophe risk modeling, has recognized that its 100-year database of historical Atlantic hurricane activity will no longer be a valid predictor of future risk.⁵⁹

The evidence collected by RMS (and further validated by a team of leading scientists from Florida State University, the Massachusetts Institute of Technology, Princeton University and University College London) indicated that over the next five years, the frequency of hurricanes that make landfall would be greater than the long-term historic average. This is because research shows that hurricane risks have greatly intensified due to higher sea surface temperatures, which are expected to continue for at least five years.

As a consequence, in May 2011 RMS released a newly calibrated catastrophe model for Atlantic tropical storms. The new model had very significant implications for property insurance underwriting, and pricing.⁶⁰ RMS's updated hurricane model reflected a number of new realities, including the effect of wind losses much further inland than previously simulated; new storm surge models; changes to hurricane frequency rates by region; and overall increased vulnerabilities.⁶¹ More specifically, based on the new five-year, forward-looking perspective, RMS expects that:⁶²

- ➔ The likelihood of a Cat 3 storm-making landfall on the U.S. coast will be about 20% higher than previously modeled.
- ➔ Modeled losses will increase by 40% on average for the Gulf Coast, Florida, and the Southeast.
- ➔ Modeled losses will increase by 25% to 30% on average for mid-Atlantic and Northeast coastal regions.

These changes in loss estimates are solely attributable to changes in hurricane frequency and severity predicted by RMS. Additional damage increases are possible due to other dimensions of its model and relate to factors such as building characteristics including occupancy, construction type and local building codes.

More than a few insurers reacted to the changes in RMS's hurricane model with skepticism, which was unsurprising given the magnitude of its potential impact on a company's underwriting and pricing strategies. Effectively, the model suggested not only higher rates, but also, in some instances, policy non-renewals or the need for additional reinsurance coverage.⁶³

As a consequence of the new RMS hurricane catastrophe loss models, along with 2011 record property losses from extreme weather events, commercial insurance buyers are paying more for certain types of coverage in 2012.⁶⁴ *Business Insurance* reported that both Willis Group and Marsh & McLennan have seen property insurance rates for catastrophe-exposed risks increase in the range of 10% to 20% during the first quarter of 2012 for commercial insurance buyers.⁶⁵ Ultimately, these higher costs are often passed on to consumers in the form of higher prices for goods and services.

⁵⁹ NAPCO LLC, "The Impact of Changes to the RMS U.S. Hurricane Catastrophe Model," 2011. Retrieved online from <http://www.napcollc.com/articles/JuneReviewRMSHurricane.pdf>.

⁶⁰ Guy Carpenter, "World Catastrophe Reinsurance Market Review," September 2011, Retrieved online from <http://www.guycarp.com/portal/extranet/insights/reportsPDF/2011/World%20Catastrophe%20Report%202011.pdf?vid=2>.

⁶¹ Sherry Thomas, "Meeting the challenges of RMS Version 11 US Windstorm model," *Business Insurance*, January 29, 2012. Retrieved online from <http://www.businessinsurance.com/article/20120129/NEWS04/120129912?tags=%7C306%7C64%7C76%7C81%7C342>.

⁶² NAPCO LLC, "The Impact of Changes to the RMS U.S. Hurricane Catastrophe Model," 2011. Retrieved online from <http://www.napcollc.com/articles/JuneReviewRMSHurricane.pdf>.

⁶³ Erik Holm, "Insurers Grow More Skeptical of Catastrophe Models," June 5, 2012, *The Wall Street Journal*. Retrieved online from <http://online.wsj.com/article/BT-CO-20120605-710657.html>.

⁶⁴ Bill Kinealy, "Property/casualty insurance rates increasing modestly," *Business Insurance*, April 15, 2012. Retrieved online from <http://www.businessinsurance.com/article/20120415/NEWS04/304159952>.

⁶⁵ Ibid.



Consumers themselves are also paying higher insurance premiums. Based on research conducted by MarketScout, while on average homeowners are seeing their rates increase only about 1 to 2 percent, that figure includes millions of homes in locations that do not have catastrophe exposures. Homeowners in wind-exposed areas are seeing rate increases in the range of 5% to 12% and many insurers are restricting capacity, increasing deductibles, or requiring wind mitigation constructions.⁶⁶

Along with rate increases, taxpayer subsidies for “public” insurance plans may become an even greater issue. To make basic coverage obtainable for everyone who wants or needs insurance, special insurance plans, referred to as “residual” or “involuntary” markets have been set up by state regulators working with the insurance industry. During the past 30 years, expanding coastal populations and artificially low rates have driven dramatic growth of residual property markets in hurricane-exposed states. Total exposure to loss has gone from \$55 billion in 1990 to \$885 billion in 2011 and the number of policies in force has tripled.⁶⁷ Residual markets are likely to increase further due to increasing hurricane risks.

Because residual markets frequently do not charge actuarially sound rates, meaning plan rates are not commensurate with the risks underwritten, residual markets are almost never self-supporting. Of the 31 FAIR (short for “Fair Access to Insurance Requirements Plans” which are state run insurance programs for high-risk property exposures) plans for which data is available, 28 have incurred at least one operating deficit since 1999, according to the Insurance Information Institute.⁶⁸ When this happens, all insurers are assessed to make up the difference, and these surcharges are typically passed directly to consumers across the state and country.⁶⁹

In some years we will still experience more mild hurricane seasons. Ultimately, these periods are not expected to prove sufficient to compensate for large loss events, as experts forecast that damage costs will continue to accelerate in the long term. Therefore, the ever-growing value of property insured under the residual market plans seriously imperils states’ fiscal health. In addition to these explicit risks, state and city governments are also assuming higher implicit risks, as property owners assume that government assistance in times of need will be forthcoming.

66 “MarketScout: Personal Lines Rates Up 1 Percent in April,” *PropertyCasualty 360*, May 9, 2012. Retrieved online from <http://www.propertycasualty360.com/2012/07/12/politics-policyholder-sentiment-drive-rapid-residu>.

67 Dr. Robert P. Hartwig and Claire Wilkinson, “Residual Market Property Plans: From Markets of Last Resort to Markets of First Choice—2012,” Insurance Information Institute, July 2, 2012. Retrieved online from http://www.iii.org/white_papers/residual-market-property-plans-from-markets-of-last-resort-to-markets-of-first-choice-2012.html.

68 Ibid.

69 Ibid.

A Critical Role for Insurers



There is evidence from all around the world that society is increasingly vulnerable to the impacts of weather related natural catastrophes. In even the best-case scenarios, this will increase due to climate change.

“In almost all cases society picks up a large portion of the costs involved with climate related weather events. Over the last ten years about 53% of the loss in the developed world has been covered by insurance. In the developing world this figure is less than 7%. This underlines the need to expand the use of insurance to help manage climate risk and make society more resilient to severe weather.”

Mark Way, Head Sustainability for Swiss Re in the Americas

Strengthening resiliency, while reducing future greenhouse gas emissions, are necessary and complementary strategies to dealing with climate change. Governments and private businesses are already taking steps and are heavily investing in climate change planning. Such actions are focused, for example, on storm resistant buildings, clean and renewable energy, improved transportation options, land use planning, new building codes, and risk assessments.

Insurers have historically been influential in motivating society to reduce risks. Insurers have much to offer, and much at stake, in helping governments and the private sector to further understand and develop solutions to better predict and prevent losses from extreme weather events.

For instance, stronger urban resiliency, especially coastal areas vulnerable to more intense storms and sea level rise, is of great importance to the insurance sector as it reduces property risks, promotes future insurability, and presents the opportunity to develop innovative new risk transfer and insurance solutions to manage climate risks. Insurers—working hand-in-hand with local governments, property owners and real estate developers—will increasingly have the position and influence to impact the overall risk landscape.

A recent paper by Harvard Law School's Emmett Environmental Law & Policy Clinic⁷⁰ identified important mutual benefits that

accrue to both insurers and municipalities, which engage and identify actions to promote climate adaptation. These include:

- **An understanding** of the physical and economic risks to the local community;
- **Participation** in the development of innovative adaptation tools; and
- **Ensuring** the future insurability of local communities.

Forward thinking insurance companies are already moving ahead. In an influential study on the *Economics of Climate Adaptation* (ECA), Swiss Re and other leading organizations developed a methodology to quantify local climate risks and provide decision-makers with the necessary facts to design a cost-effective climate adaptation strategy.⁷¹ The study makes clear that the need is urgent and the benefits compelling.

“Over the past 50 years, severe weather disasters have caused some 800,000 deaths and over a trillion dollars in economic loss—and in the present decade the damage wrought by such disasters has reached record levels. Economies in many parts of the world are already susceptible to significant disruption from today's climate—and continued economic growth could put even more value at risk. Climate change could cause significant incremental loss, even within the next 20 years.

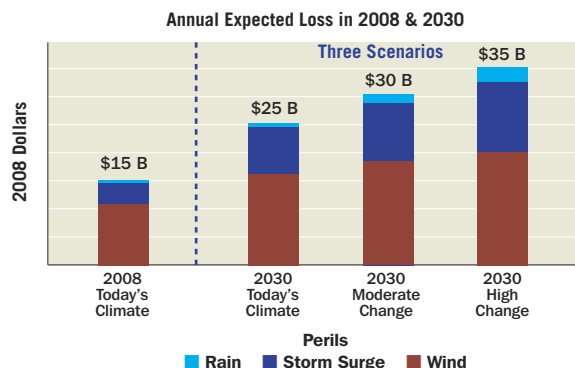
Report of the Economics of Climate Adaptation Working Group, “Shaping Climate Resilient Development, A Framework for Decision-Making,” 2009.

A key finding of the study is that despite significant uncertainty about the potential effects of global warming on local weather patterns, there exists enough understanding today to build reasonable scenarios upon which to base decision-making. The study concludes that the time for action is now. Intensified climate change scenarios lead to significantly higher annual loss expectations, demonstrating the imperative that greenhouse gas emissions must be reduced, while resiliency planning is also underway.

⁷⁰ Richard Lou, Sarah Fort, Shaun A. Goho, and Wendy B. Jacobs, “Municipal Climate Change Adaptation and the Insurance Industry,” Harvard Law School's Emmett Environmental Law & Policy Clinic, April 2012. Retrieved online from <http://www.law.harvard.edu/academics/clinical/elpc/publications/publications.html>.

⁷¹ Report of the Economics of Climate Adaptation Working Group, “Shaping Climate Resilient Development, A Framework for Decision-Making,” 2009. Retrieved online from http://www.swissre.com/rethinking/climate/Strengthening_climate_resilience.htm.

Figure 15: Loss in Different Climate Change Scenarios by Hazard: Florida, Economics of Climate Adaptation Study



Source: Report of the Economics of Climate Adaptation Working Group, "Shaping Climate Resilient Development, A Framework for Decision-Making," 2009.

An important conclusion is that climate risks are best managed through a combination of loss prevention, loss reduction and risk transfer (e.g. insurance). Policies and actions that reduce risk/increase resiliency are critical to ensuring future availability and affordability of insurance in a given market. Such investments might include infrastructure improvements such as strengthening buildings and road elevations, along with changes to land use policies.

The ECA report also provides a sobering reminder:

"... in most cases there remains a proportion of climate-related risk that cannot be averted through known adaptation measures—underlining the fact that adaptation, no matter how well designed, cannot be a substitute for action to reduce carbon emissions and slow the rate of global warming."

Report of the Economics of Climate Adaptation Working Group, "Shaping Climate Resilient Development, A Framework for Decision-Making," 2009.

There are many other excellent examples of insurance sector leadership in addressing climate risks. However, industry-wide engagement and action in this regard is nowhere near its potential. Among the positive examples is **ClimateWise**, which was launched in 2007 and has become a key initiative that involves roughly 38 organizations including leading insurers and reinsurers such as Allianz, Aviva, Lloyds, Prudential and RenaissanceRe and major insurance brokers, including AON, Marsh and Willis to name just a few. Major insurance industry associations such as the Association of British Insurers have also joined ClimateWise.

CLIMATEWISE INSURANCE MEMBERS

- Association of British Insurers
- ACE Group
- Allianz
- Amlin
- AON
- Argo International
- Aviva
- Beazley
- Brunel Professional Risks
- Catlin Group
- Chartis Group
- Chaucer Insurance
- Chartered Insurance Institute
- The Co-operative Insurance
- Cunningham & Lindsey
- Ecclesiastical
- Equity Redstar
- Friends Life
- Hardy Group
- Hiscox
- if P&C Insurance
- Kiln
- Legal & General
- Lloyd's
- Marsh
- The Navigators Group
- Prudential
- QBE Insurance Group
- RRS Insurance
- RenaissanceRe
- RMS
- RSA
- Santam
- Swiss Re
- Tokio Marine Nichido
- Tryg
- Willis Group
- Zurich

Source: ClimateWise website <http://www.climatewise.org.uk/members/>, accessed September 14, 2012.

ClimateWise members pledge to "lead the way in analyzing and reducing risks; support climate awareness amongst our customers; incorporate climate change into our investment strategies; inform and engage in public policy debate; and reduce the environmental impact of our businesses."⁷²

Through ClimateWise, insurers are engaged in a number of collaborative efforts, which bring together experts from the businesses community, industry bodies and academia to deepen understanding and accelerate solutions to climate risks. This should serve as a model for all insurers, and is most certainly in their own best interests, as well as that of society at large.

CLIMATEWISE PRINCIPLES

ClimateWise insurance company members commit to action, individually and collectively, against the six ClimateWise Principles to reduce the risk of climate change for us all.

1. Lead in risk analysis
2. Inform public policy making
3. Support climate awareness amongst our customers
4. Incorporate climate change into our investment strategies
5. Reduce the environmental impact of our business
6. Report and be accountable

Source: ClimateWise website <http://www.climatewise.org.uk/about/>, accessed September 14, 2012.

⁷² Since its launch in 2007, ClimateWise has established partnerships with several international insurance associations including the Confederation of Brazilian Insurance Trade Associations, the International Cooperative and Mutual Insurance Federation, and the South African Insurance Association. See <http://www.climatewise.org.uk/>.

Recommendations

(RE) INSURANCE COMPANIES

How insurers respond to climate change will have repercussions for every aspect of their business, encompassing financial results and balance sheet strength, new premium growth and customer retention, investor relations and reputation. To remain competitive in the future operating environment, insurers should:

- **Evaluate and price the increased risk exposure of insured property in the context of climate change and new/emerging extreme weather patterns.** Insurance companies—and the companies (and individuals) they insure—need to look at their risk exposure and evaluate losses to insured property based on expected future climate change trends, not on past experience. To do this, insurers will need to:
 - **Support/undertake research on national and regional forecasting of future weather and catastrophe patterns.** While there is strong scientific consensus around climate change, there is a particular need to advance our understanding of the likely impacts of warming temperatures on the frequency and severity of thunderstorms, hailstorms and tornadoes, of which little is known. The change in frequency and intensity of other perils such as hurricanes, droughts and wildfires also need to be better forecasted at the local level.
 - **Develop and use catastrophe models that anticipate the probable effects of climate change on extreme weather events.** There is clearly a need to better anticipate how projected changes to weather will increase the risk of loss to insured properties. Insurers with deep scientific resources should partner directly with climate scientists to develop new modeling capabilities. For carriers with little scientific expertise, it is equally important that climate change's impact on extreme inland and coastal weather events be a routine part of the conversation with catastrophe model vendors and reinsurance brokers.
 - **Update insurance pricing and underwriting of risks to reflect changes in extreme weather impacts/changes on property damage loss trends.** Insurers need to ensure that rates and loss reserves adequately cover damages from higher frequency and severity of catastrophic events. Insurers will also need to increase their ability to offer preferential pricing to property owners who have increased the resiliency of their structures.

- **Inform land use planning, infrastructure design and building codes to ensure continued insurability in critically exposed markets and markets expected to face future insurability challenges.** The potential for damages from extreme weather events is a major threat to all aspects of society, including our critical infrastructure (including roads, bridges, airports, water treatment facilities and dams). Insurers can lend their expertise directly to planners and work collaboratively with nongovernmental organizations with on-the-ground capacity in critical population centers. More insurers also need to develop underwriting guidelines and rate plans that include premium discounts for homes and commercial structures that follow specific guidelines to increase their resiliency.

Some leading industry organizations such as The Institute for Business and Home Safety (IBHS) have shown significant leadership around public-education on building stronger/safer, more energy-efficient buildings. Drawing upon the expertise of IBHS, all insurers need to be much more proactive in providing customers with information on how to make their property more disaster-resistant.

- **Promote reduction of carbon emissions.** As society's risk managers, insurance markets must reflect the reality of climate change and heightened risks through their pricing and underwriting. Insurers also need to play a bigger part in building greater resiliency to extreme weather impacts. These actions should be undertaken immediately and without further delay, as climate change from historic greenhouse gas emissions is already underway.

By reducing green house gas (GHG) emissions we can still limit the severity of climate change impacts. Insurers must also help enable the transition to a low-carbon economy by offering new products and services that promote the scaling of clean and efficient uses of energy; encouraging customers to adopt climate-change mitigation practices that lower their carbon emissions footprint; and encouraging policymakers to take steps to reduce carbon emissions.

In conclusion, insurers have a critical role to play in helping society to understand and price risks associated with global warming, promote and build greater resiliency to expected extreme weather, and reduce carbon emissions to avert the worst-case scenarios in the longer term.

INSURANCE SECTOR INVESTORS/RATING AGENCIES

Because climate change is likely to intensify the other factors that shape the sector's competitive landscape—including ability to price accurately given the constraints of available technical pricing tools, regulatory ceilings, and the downward pricing pressure of competition—it is likely that companies with defined climate change governance or management approaches will be better positioned to protect shareholder value and honor obligations to debt holders in the coming years.

To assess companies' sensitivity to climate change and their ability to manage this driver of future performance, insurance creditors and shareholders should:

- Build climate change management practices into regular dialogue with company management.
- Conduct their own credit analysis of insurers to capture factors related to climate risk that are not incorporated by rating agencies.
- Assess the quality of insurer disclosure related to climate risks and opportunities.

The questions below are a starting point for shaping dialogue between insurers, rating agencies and investors:

Disclosure

- Does the company provide public disclosure of its approach to climate risk management in its filings with the SEC and with insurance regulators?
- Are the company's filings with insurance regulators more than perfunctory exercises to comply with applicable mandates? Does the disclosure provide insight into the company's strategy for addressing climate risk and articulate the view of management and directors?

Catastrophe Modeling

- What perils does the company model? How is the company adjusting loss modeling to account for catastrophe potential outside its own loss experience?
- Does the underwriting division have in-house modeling capacity? To what extent does the company rely on guidance from reinsurance brokers to model loss potential, adjust reinsurance coverage and set pricing?

Exposure Management

- What adjustments has the company made to its exposure concentration in light of recent catastrophe experience or anticipated statistical shifts? Is the company over-weighted in market share toward certain geographies?
- How has management considered long-term market strategies that can effectively manage exposure without unduly constraining future market opportunities?

U.S. PROPERTY/CASUALTY INSURANCE CLIMATE RISK DISCLOSURE/REPORTING

National Association of Insurance Commissioners (NAIC)

In February 2012, the insurance commissioners of California, Washington State, and New York State announced that all insurance companies operating in their states and writing more than \$300 million in premiums each year will be required to assess and publicly disclose the climate change related risks they face, both in their underwriting as well as in their investment activities.

This development reflects a significantly expanded effort to assess the climate risk disclosures of approximately 300 insurance companies. It is anticipated that the results of the evaluation analysis will be used to guide state regulators to enforce and strengthen the requirements to spur the entire industry to disclose its climate risks.

Securities and Exchange Commission (SEC) Interpretive Guidance on Climate Risk

In 2010, at the request of investors, the Securities and Exchange Commission (SEC) issued interpretive guidance outlining publicly traded companies' duty to disclose material risks associated with climate change, including climate-related physical risks. The SEC cited insurers' altered loss potential from extreme events as a result of climate change as one example of risk that, when material, should be disclosed in securities filings.

According to the SEC "Possible consequences of severe weather could include; increased insurance claims and liabilities for insurance and reinsurance companies and increased insurance premiums and deductibles, or a decrease in the availability of coverage, for registrants with plants or operations in areas subject to severe weather."

Risk Retention

- How does the company factor climate change into its ratio of risk retained on its balance sheet to risk transferred to reinsurance providers or the capital markets?

Climate Risk Governance

- Does the company have defined committees at the board and management levels for governing climate risks?

INSURANCE REGULATORS

Climate change threatens not only the financial health of insurers, but also the availability and affordability of insurance for consumers. As a result, state regulators have a critical role to play in ensuring that the industry is properly addressing climate risks. A number of states, including California, Washington and New York, have taken steps over the past several years to better understand the implications of climate change for insurers. State regulators should build on this leadership by:

- **Strengthening mandatory climate risk disclosure by expanding the number of states participating and clarifying disclosure expectations.** Disclosure is critical because it provides regulators, consumers, and other market actors with information on how individual companies, and the industry as a whole, are likely to be impacted by climate change and what steps they are taking to manage those impacts. It is the foundation on which all other action by regulators will be based, and so it is imperative that the disclosure process be designed in a way that is likely to elicit constructive responses. As a result, regulators are encouraged to consider revising the climate disclosure survey to improve its usefulness. The lack of specificity in the current disclosure survey has led to responses that are frequently vague and unhelpful, with little consistency in how insurers address major trends, including pricing, modeling and governance. Regulators should consider providing more detailed guidance documents in planning future survey responses. Other states should also join CA, WA, and NY in requiring disclosure from companies licensed to operate in their states.
- **Building climate risk considerations into the financial oversight process.** As stated previously, there is growing evidence that climate change will increasingly contribute to more frequent losses, and will have potentially serious implications for the financial health of many insurers, including negative impacts on liquidity and capital needs. There is also significant evidence that climate change poses risks for insurers' invested assets. As a result, the National Association of Insurance Commissioners (NAIC) is working to add questions related to climate change to the Financial Condition Examiners Handbook. States should increasingly make use of these questions as they work to address climate risk in the financial examination process.

- **Creating more shared resources to help insurers analyze and respond to climate-related risks and opportunities.**

Responses to last year's NAIC climate survey suggested that many companies lack the resources to conduct the research and analysis needed to fully understand the ways in which climate change is likely to impact them. The survey results suggested several areas in which additional research and resources would be particularly useful, including:

- **Investment Risks and Opportunities:** Regulators could engage with investment consultants and asset managers to better understand insurer portfolio exposure and climate-sensitive asset allocation strategies.
- **Correlated Risks:** An assessment of the potential for emergent correlated risks between insurers' underwriting and investment portfolios would better inform future examination procedures.
- **Loss Modeling:** Regulators and carriers would mutually benefit from clarification of how today's loss models incorporate climate parameters.

- **Working with insurers and consumers to better align incentives for long-term risk reduction.** A robust private property/casualty insurance market is an important contributor to our nation's long-term ability to remain resilient in the face of increasingly extreme weather. In order to maintain a financially viable private insurance market, and communicate the true cost of risk to consumers, insurers need to be allowed to charge risk-based premiums. However, insurers should also reward consumers who have taken steps to reduce their risks with lower rates.

At the same time, much uncertainty remains around exactly how climate change will impact losses. Regulators therefore should engage with insurers, and with consumers, to better understand the nature of these risks, and how they will impact rates, as well as what steps insurers and regulators can take to better incentivize consumers to increase the resiliency of their homes and businesses.

In recent years a number of new disclosure mandates have emerged from the regulatory communities which are seeking stronger insurance company disclosure of climate change risks. While these enhanced disclosure expectations may prompt management to fold climate change into the many business environment factors influencing corporate earnings potential, they are not a substitute for fundamental research or targeted dialogue between investors and management.

Diligent attention from shareholders, regulators and corporate managers alike will be necessary to protect shareholder value and ensure that insurers can continue to play their critical role transferring and managing economic risks.

Appendix:

MAJOR U.S. WEATHER/CLIMATE DISASTERS – 2011

Event	Description & Location	Date	Losses (\$ b)	Deaths
Tropical Storm Lee	Wind and flood damage across the southeast (LA, MS, AL, GA, TN) but considerably more damage from record flooding across the northeast (PA, NY, NJ, CT, VA, MD).	Early September 2011	> \$1	21
Hurricane Irene	Wind damage in coastal NC, VA, and MD was moderate with considerable damage resulting from falling trees and power lines, while flooding caused extensive flood damage across NJ, NY, and VT. Over seven million homes and businesses lost power during the storm.	August 20-29, 2011	> \$7.3	45
Severe Weather – Tornadoes/Hail	An outbreak of tornadoes, hail, and high wind caused damage east of the Rockies and across the central plains (CO, WY, IA, IL, MI, MN, OH).	July 10-14, 2011	> \$1	2
Upper Midwest Flooding	Melting of an above-average snow pack across the Northern Rocky Mountains combined with above-average precipitation caused the Missouri and Souris Rivers to swell beyond their banks across the Upper Midwest (MT, ND, SD, NE, IA, KS, MO).	Summer 2011	> \$2	5
Historic Wildfires Spring-Fall 2011	Continued drought conditions and periods of extreme heat provided conditions favorable for a series of historic wildfires across Texas, New Mexico and Arizona, destroying over 3 million acres and 1,500 homes across Texas alone.	Spring-Fall 2011	> \$1	5
Southern/Southwest Drought and Heat Wave	Drought and heat wave conditions created major impacts across TX, OK, NM, AZ, KS, and LA.	Spring-Fall 2011	\$10	0
Mississippi River flooding	Persistent rainfall (nearly 300 percent normal precipitation amounts in the Ohio Valley) combined with melting snowpack caused historical flooding along the Mississippi River and its tributaries.	Spring-Summer 2011	\$3 – 4	2
Midwest/Southeast Tornadoes and Severe Weather	Outbreak of tornadoes over central states (OK, TX, KS, NE, MO, IA, IL) with an estimated 81 tornadoes. Additional wind and hail damage across the Southeast (TN, GA, NC, SC).	June 18-22, 2011	\$1.3	3
Midwest/Southeast Tornadoes	Outbreak of tornadoes over central and southern states (MO, TX, OK, KS, AR, GA, TN, VA, KY, IN, IL, OH, WI, MN, PA) with an estimated 180 tornadoes and at least 177 deaths. Notably, an EF-5 tornado struck Joplin, MO resulting in at least 160 deaths, making it the deadliest single tornado to strike the U.S.	May 22-27, 2011	\$9.1	177
Southeast/Ohio Valley/Midwest Tornadoes	Outbreak of tornadoes over central and southern states (AL, AR, LA, MS, GA, TN, VA, KY, IL, MO, OH, TX, OK) with an estimated 343 tornadoes. Several major metropolitan areas were directly impacted by strong tornadoes including Tuscaloosa, Birmingham, and Huntsville in Alabama and Chattanooga, Tennessee.	April 25-28, 2011	\$10.2	321
Midwest/Southeast Tornadoes	Outbreak of tornadoes over central and southern states (OK, TX, AR, MS, AL, GA, NC, SC, VA, PA) with an estimated 177 tornadoes.	April 14-16, 2011	\$2.1	38
Southeast/Midwest Tornadoes	Outbreak of tornadoes over central and southern states (NC, SC, TN, AL, TX, OK, KS, IA, WI) with an estimated 59 tornadoes.	April 8-11, 2011	\$2.2	0
Midwest/Southeast Tornadoes	Outbreak of tornadoes over central and southern states (KS, MO, IA, IL, WI, KY, GA, TN, NC, SC) with an estimated 46 tornadoes.	April 4-5, 2011	\$2.8	9
Groundhog Day Blizzard	A large winter storm impacting many central, eastern and northeastern states. The city of Chicago was brought to a virtual standstill as between 1 and 2 feet of snow fell over the area.	Jan 29-Feb 3, 2011	\$1.8	36

Source: NOAA: 2011 a Year of Climate Extremes in the United States. Retrieved online from http://www.noaa.gov/stories/2012/20120119_global_stats.html.



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